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August 4, 1923

Electrical World

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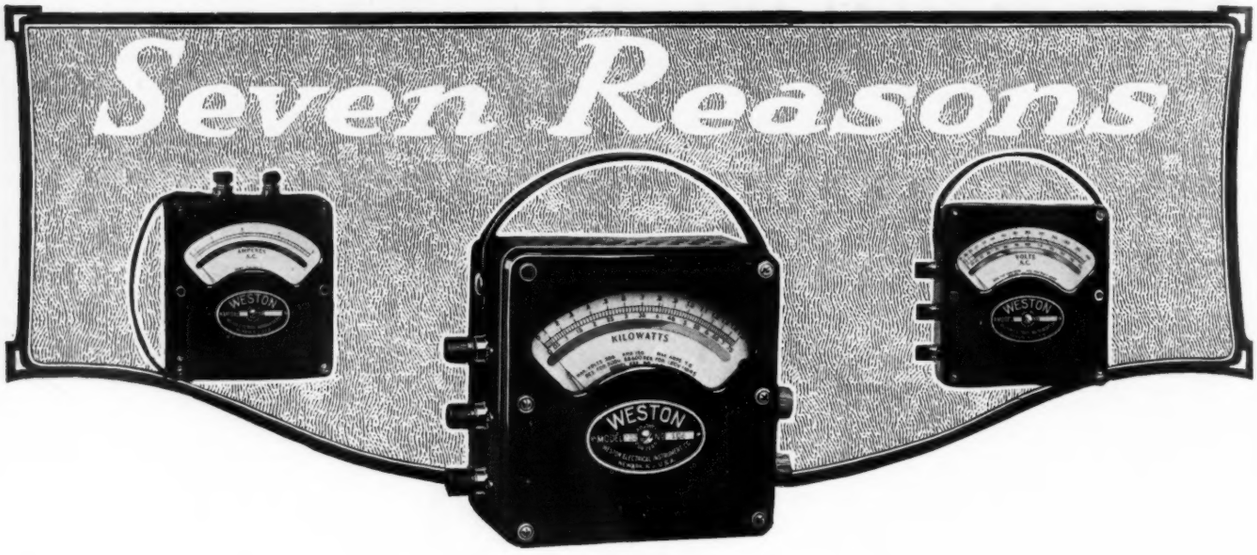
See article "Tractor Moves Heavy Transformers"



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W. H. ONKEN, JR. Editor — HAROLD V. BOZELL Editor

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Operating Companies and the College-Bred Engineer

A RECIPROCATING engine belted to a dynamo, a wooden switchboard with a couple of shaky knife switches and a gravity voltmeter, "Jim the engineer" in overalls, with a long-spouted oil can, and a begrimed fireman at a distance—what an attractive picture for a college student to think of as a possible career for himself! True, this is only a picture of an irrevocable past in so far as the operating side of the industry is concerned, but do the best college boys of today understand that this is a picture of the past and that the real immense problems of design, construction and operation of large electric properties call for men of first-rate ability?

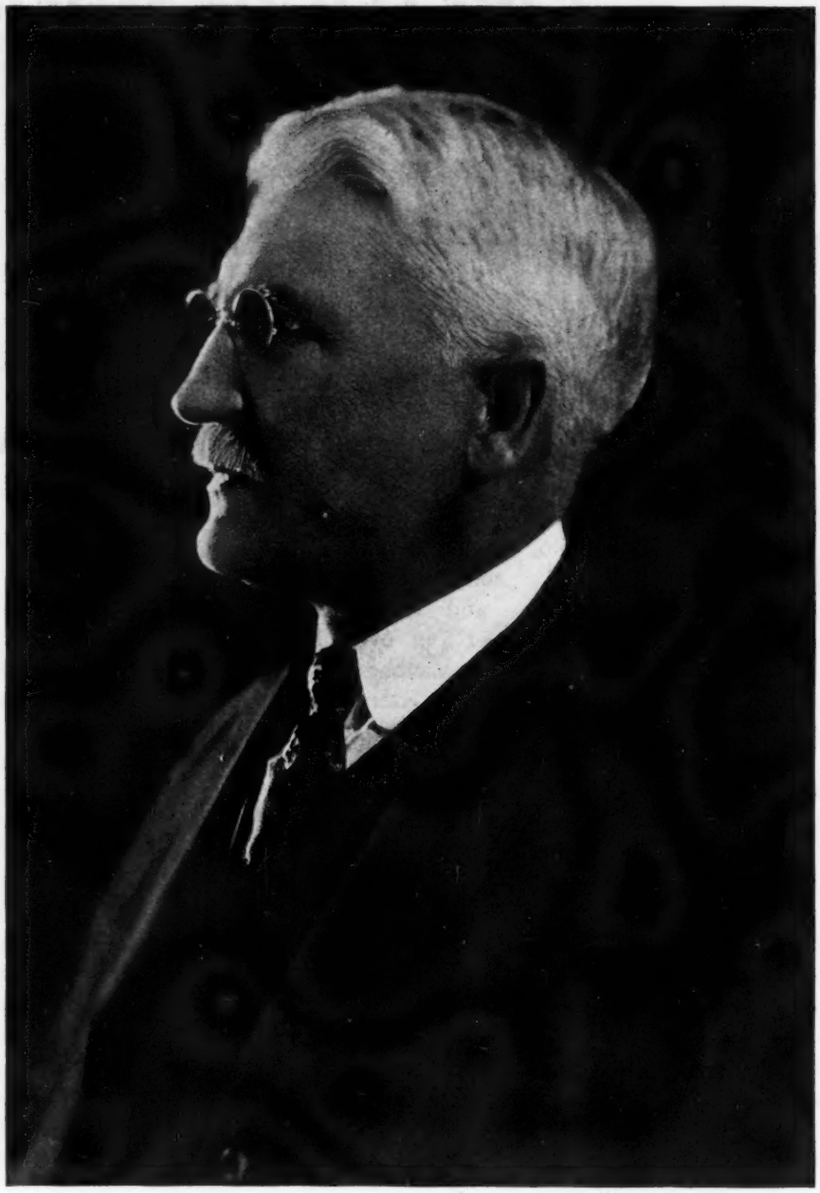
Perhaps the word "operating" is the first obstacle encountered when one tries to arouse interest among the most energetic students in becoming public utility engineers. "A guy in overalls shovels coal at one end and another guy, with a white collar on, collects money at the other end. The franchise excludes competition, a fair price is fixed by some commission, and that is all there is to it," is a young graduate's opinion. Possibly if the word "operating" were replaced by the word "fighting," "struggling," "overwhelming" or some such forceful adjective, this career would appeal to real red-blooded American youths much more, and perhaps it would be more significant of the real activity of the men who keep our homes lighted and industries operating, rain or shine, through troubles little known. Somehow the words "operating," "operative," "operator," suggest an anemic girl who slowly and automatically performs the same simple mechanical motion day after day, year after year.

There is no use in blaming teachers of engineering for the evident ignorance among the students of the really great and perplexing problems of power generation, distribution and use. The best instructors teach neither the manufacture nor the operation of electrical apparatus. They teach the fundamental laws of nature in the form applied to electrical apparatus and circuits. It is for the leaders of the operating industry itself to make up their minds that they need the best young engineering talent and to go after it as they have gone after manufacturers to produce better generators, better insulators and better cables.

The principal manufacturers of power and communication apparatus have been spending considerable effort and money to attract the best young engineers, and their endeavors are bearing ample fruit. The largest operating companies might well pool their efforts and maintain a joint educational department, with a properly laid out apprenticeship course, and also have their best men travel among the colleges and explain to the students the outstanding problems and opportunities of the industry. The N. E. L. A. committee on relations with educational institutions can only lay down the general principles of this activity. Like any unpaid large committee of busy men, its work will be slow, and the large operating companies might just as well make up their minds to put real money into the recruiting of young engineers.

Earnest McCleary

An electrical contractor who has contributed greatly to the development of the electrical code and the advancement of the standards of electrical construction.



THE story of the electrical contractor in this country has been a record of a long struggle by a mere handful of far-seeing leaders to raise the standard of electrical wiring by organization and education and to secure for the guidance of the men engaged in it a practical, understandable and progressive code. One of the conspicuous pioneers who have persisted in the effort for many years is Earnest McCleary, now president of the McCleary-Harmon Company of Detroit. For nearly a quarter of a century he has worked for the development of better electrical construction and the closer organization of that branch of the industry.

Born in 1865, Mr. McCleary was thrown on his own resources at the early age of twelve and supported and educated himself until, at eighteen years, he was stricken with tuberculosis. In the hope of regaining his health he shipped before the mast on the Lakes and succeeded in building up a robust strength that has never again failed him. Then he became a groundman for the Michigan Bell Telephone Company and by degrees worked up until he was superintendent of the Electric Supply & Engineering Company in Detroit, and in 1900 he organized a company of his own.

In 1901 Mr. McCleary was one of the thirty-one men who organized the National Electrical Contractors' Association, serving soon after as the association president, and from that time on he has been one of the conspicuous leaders of this branch of the industry. In 1905 he was made chairman of the N.E.L.A. code committee and later he became a member of the electrical committee of the National Fire Protection Association, where for fifteen years he fought the contractors' battle for a more liberal and intelligible electrical code.

Mr. McCleary is a man of striking personality, forceful in debate, and an able organizer, with strong qualities of leadership and executive capacities. He is gifted with an almost unfailing memory and has come to be an authority on co-ordinate organization in the electrical industry. He has a host of friends and a wide acquaintanceship throughout the industry.

Mr. McCleary has been exceedingly successful as a contractor, and at present is engaged in the installation of a $300,000 electrical equipment in the new $6,000,000 Masonic Temple in Detroit, probably the largest single job of its kind on record, given into his hands to develop according to his own judgment and under his own inspection—no small tribute to his reputation as a man and a contractor.

Editorial Comment

Electrical World, August 4, 1923

Volume 82 Number 5

A General Awakening to the Importance of Public Relations Work

INDIVIDUALLY, progressive companies long since realized the value of harmonious public relations and have striven to promote them. But, collectively, operating companies have never before manifested such an earnest desire to bring about a better understanding between utilities and the public as was demonstrated in various sessions of the N. E. L. A. convention recently held in New York. It was inspiring, to say the least, to observe every one searching for the same thing—a method of serving the public best. It would have been fortunate if every employee and representative of every company, utility or other, could have listened to the speeches and caught the spirit of the convention, for the lesson is universal.

Service and courtesy, of course, lie at the bottom of all activities which prosper permanently—not service in one direction only, but in every department, in every point of contact with the public. Employees who fail to qualify in this vital particular are incompetent—a fact recognized today by progressive utility companies everywhere, which rightly refuse to retain in their service those who cannot or will not perform their duties in this spirit. These companies know that their treatment of patrons may mean the difference between success and failure and grasp the self-evident fact that the company whose officials never find it too much trouble to talk over things with a complaining customer is the one which will in turn receive the most considerate treatment at the hands of the public.

Given service and courtesy, the next need is mutual understanding—an understanding on the part of the public of the industry and its problems and, what is equally important, an understanding by the industry of the mental attitude of the public toward it. Understanding, like charity, begins best at home, and the wise utility will take the first step in its own household; that is, the executives will take their subordinates into their confidence and tell them frankly about capitalization, franchises, size of investment required, how money is raised and all the other things about which the old plan of secrecy has no proper place in honest business.

To approach, interest and instruct the outside public is not quite so easy, but many avenues exist. For the younger generation there are the schools, in many of which in all parts of the country information on public utilities is now given. In the civics courses in high schools a special field is open, and it should be feasible to include instruction on public service (including rate making and regulation) in new or revised textbooks. More mature customers, actual or potential, may be enlightened through speeches before chambers of commerce and men's and women's clubs of every sort and through the activities of public utility information bureaus. Close relations with financial institutions will help to spread the story, which should be made familiar to every bond salesman.

The various prescriptions for improving public relations that are contained in the convention report printed in the ELECTRICAL WORLD for June 9 are full of merit and deserve careful study from executives awake, as virtually all are, to the paramount importance of the matter.

Practical Development of Water Power—the Farmers' Interest

IT IS rather surprising that the American Farm Bureau Federation should circulate as an apparently official document the report of Gray Silver, its Washington representative, containing as it did his personal dicta on water-power development and fixed costs as an element of cost of power (see ELECTRICAL WORLD, July 28, 1923, page 197). The picture which Mr. Silver paints of the benefits of electrified farms is one which all fair-minded men are anxious to see made a reality as soon as possible. Electricity on the farm will be one of the most potent forces toward a satisfied, balanced American society. But with Mr. Silver's conclusions as to financial and economical means of providing this service there is sure to be disagreement. It is not a question of capitalism versus communism. The point is not government versus private ownership and operation (though Mr. Silver refers to the lower interest cost of public credits). The Farm Bureau Federation officially and through its president, O. E. Bradfute, is already on record as recognizing the more efficient and effective development through private control. The question is really one of first principles as to the soundness of Henry Ford's ideas on practical finance in quasi-public enterprises where large first costs are involved. Are these first costs to be paid by present users and the future users to benefit therefrom? It seems pertinent to inquire whether the farmer expects the purchaser of his first year's wheat crop to pay the price of the wheat plus the cost of the entire farm as well so that next year's purchaser may have cheaper wheat. Fixed labor in the form of capital costs is as much a part of the cost of each kilowatt-hour as are current labor and materials, and the practical, equitable division of these costs between all users, both present and future, is what is to be desired.

A comprehensive—a complete—electrification of American farms is desired by all electrical men, from a viewpoint of national pride and of constructive development of the nation as well as of selfish interest in providing more work for the electrical industry to do. Such reports as Mr. Silver's, however, make it increasingly apparent that the Farm Bureau Federation and the electrical industry, already co-operating in research to find how best to apply power to the farm, must be even more certain that past experience in the development and production of electric service is put to good use in bringing to realization a practical electrification of American farms.

Is Kansas Three-Part Gas Rate a Prophecy?

DEFINING the terms "customer charge," "demand charge" and "gas charge," the Kansas commission has established a three-part gas rate scheme for the state that is significant in its probable influence on the general utility rate situation in that and possibly other states. The customer charge consists of the expense of bookkeeping, billing, collecting, setting, removing and repairing meters, gratuitous complaint service, office rents, meter reading and other expense and a part of the fixed charges on the physical property, the total of which the commission declares will be identical for all customers regardless of whether they use large or small amounts of gas or none at all.

Demand charges are declared to consist of the expense of providing and maintaining a production, transmission and distribution system of sufficient capacity to render service as required. It is declared that this charge should be distributed among the customers in proportion to the demand which is contracted for by each customer. The gas charge is defined as that part of the cost of producing, transmitting and distributing the gas which is in proportion to the amount of gas handled.

The three-part rate has been the subject of experiment on a number of Kansas gas properties for several years and the results, according to the utility men who have been instrumental in the work, have been thoroughly satisfactory, a conclusion that the action of the commission seems to justify. That the three-part rate scheme is adapted from the electrical field need not be told. If it proves satisfactory to the gas consumers of the state, which means that it will cover the residential as well as the business and industrial consumers, the question is how long will it be before the same scheme is applied to the whole field of electrical rates in the state. If, as the commission declares, it results in eliminating discrimination between all classes of consumers, it will not be long before the same thing will be declared of the field of electric service. If this effect is produced, it may result in a need for some basis on which to apply such a rate to the small electric consumer. This has not been generally done in the United States, though some progress in that direction has been made, notably the work of the past year or two in the residential service field at Hartford, Conn. The experiment of the Kansas commission will be watched with a great deal of interest and it may go far in its influence on the whole rate structure of both the gas and the electric industry in the United States.

Circuit-Breaker Engineering Is Making Progress

FEW beneficiaries of intercommunication are in a position to realize the pressure upon the designing engineer in the circuit-breaker field under present conditions of system growth and plant expansion. A short time ago it was satisfactory to the operating man if he were supplied with breakers capable of rupturing arcs of 150,000 to 200,000 kva. without difficulty. Now manufacturers are building breakers designed to rupture 1,500,000 kva. in the arc in both high-voltage and low-voltage equipment, and as superpower development extends, it is not improbable that still greater demands will be forthcoming. In this rapid development lies one of the major causes of the high cost of circuit breakers for heavy duty. Three dozen of the largest units now available would cost around a million dollars, so that the selection of such apparatus and its adaptation to important network or transmission service is no small problem.

Although the industry is growing too fast to permit thorough standardization of circuit breakers at this time, it is gratifying to observe that many engineers are trying to help bring this result about. Designers are no longer working in the dark as to probable performance in field service. At heavy expense testing facilities have been established in the factory which make it possible to short-circuit a turbo-generator of more than a score of thousand kilovolt-ampere rating through breakers under various conditions of voltage, line connections and reactance. The analysis of test "shots" by the oscillograph now possible within a few minutes after the arc is ruptured tells a story of great significance to both designing and operating engineers. In view of the great importance of protection on large interconnected systems with their heavy investment in transmission lines, transformers and generating units, it will pay purchasers of the higher-powered breakers to spend no little thought upon the advance determination of maximum possible short-circuit energy deliveries at different points in networks and to support thorough factory investigations of breaker performance under different conditions liable to develop in their particular fields. In this work the calculating table is already winning fresh laurels.

Admirable progress is being made at present in breaker design. Improved methods of suppressing arcs, of getting rid of gases and of adapting tanks and parts subjected to stress to more effective resistance of the explosive forces liberated are receiving the close attention of designers. Some of these problems may almost be classed as those of the artillery engineer. It is well that minute consideration is being given to such matters as quality of material, dimensions and proportions of structures, treatment of oil, limitations of breaking capacity in relation to speed of opening and length of arc, and other related matters. At the moment there is a decided trend toward compensated mechanical coupling in isolated phase work, which some engineers consider superior to electrical tripping. Isolation of arcs and the separation of oil and gases mark real progress in this field, and competition among manufacturers lends zest to the selection problem.

Electricity in German Agriculture

ANOTHER glimpse of the extent to which the use of electrical energy is being developed in foreign countries was given in the article on "Electricity in German Agriculture," by August Petri, in the July 21 issue of this paper. The principal motive force back of this special development is the economic situation in Germany created by the war. Men are scarce and machine equipment must accomplish tasks heretofore allotted to human hands or these tasks must go undone. Coal is scarce and high in cost. Steam-driven agricultural machinery on the showing made requires a considerably greater amount of coal than that required to produce and distribute electrical energy from central stations; therefore, if possible, electrical energy must be used. The same argument can be extended to the field of oil fuel. It is an argument that is old in the central-station field and on it is built the present develop-

ment of American central-station and transmission systems. The significant fact is that German agriculture, and also that of other European countries, is being driven to the same conclusion regarding the use of power toward which all other industry is tending and which it has already accepted widely.

If the European farmer is driven by economic conditions toward such a solution of his difficulties and is able in some degree to meet the competition from the more favored agricultural regions of the world, what will be the result when the inevitable balance of economic forces is restored and the world is once more on a fairly level economic keel? Past experiences prove that the savings in fuel are likely to remain on the same proportional basis. The cheap-labor bar to the development of equipment that has made Europe lag behind America in mechanical methods of doing work will no longer exist in the agricultural field because the equipment will already be in use. The inevitable result is likely to be a competition with the American farmer which will make his lot still more unpleasant. At present he is meeting world competition and suffering from it with a large part of this competition under somewhat artificial handicaps.

The picture might be made a dark one if pessimism were to prevail. As a sober matter of fact the extent to which the development will or can proceed is unknown. Better still, America has as fine an equipment in its agricultural experiment station and agricultural school development as any country in the world, and that equipment is being utilized to find the answer to the problem of using electrical energy in agriculture. The account of German accomplishments, therefore, becomes merely a valuable bit of experience that can be studied and turned to profit in our own research on the subject. With a record, according to Dr. Windel, of a lighting consumption of 12.5 kw.-hr. to 22.5 kw.-hr. and a power consumption of 27.5 kw.-hr. to 42 kw.-hr. per acre from thirty-four German agricultural centers in 1920-21, against the present American average, which is probably not in excess of 5 kw.-hr. on the farms actually served, there is food for thought. The question is: How can the utilization of electricity found profitable on European farms be made profitable in America?

Formulistic Line Solutions Not to Be Relied on Wholly

FREQUENT attempts are made to set up formulas for the economic solution of a high-tension transmission installation. Generalized formulas are a valuable aid in many engineering tasks when supporting data prove the accuracy of the equations, but, on the other hand, few formulas can be used blindly, and this condition exists to an extreme degree in transmission work. The cost of a transmission system is interlinked with so many operating, social, legal, economic and technical elements that installation on the least-cost basis is a rather indefinite problem. The distance, the power transmitted, the voltage, the power factor of the load, the regulation, the efficiency, the load factor and the load distribution are technical elements linked up with the prices of various materials used in the construction of the line. Beyond these lies the realm of such intangibles as corona, lightning, ice, wind and safety. Any equation involving all such elements must be complicated, cumbersome and applicable only to a specific case.

On the other hand, a rule-of-thumb design or one based solely on comparisons with other lines is not the type of solution that should be used. The working out of such problems should be based on research, a study of existing lines, a knowledge of the properties of electric circuits, a knowledge of the terrain and a knowledge of social, economic and climatic conditions in the location and at the time the project is to be installed and operated.

The solution can be facilitated by grouping the technical elements peculiar to the electric system in one unit and the elements peculiar to the economics of the problem in another unit. The use of graphs and computations alone cannot be depended upon to lead to the correct solution. Judgment backed by long experience must give the proper weight to the various factors involved.

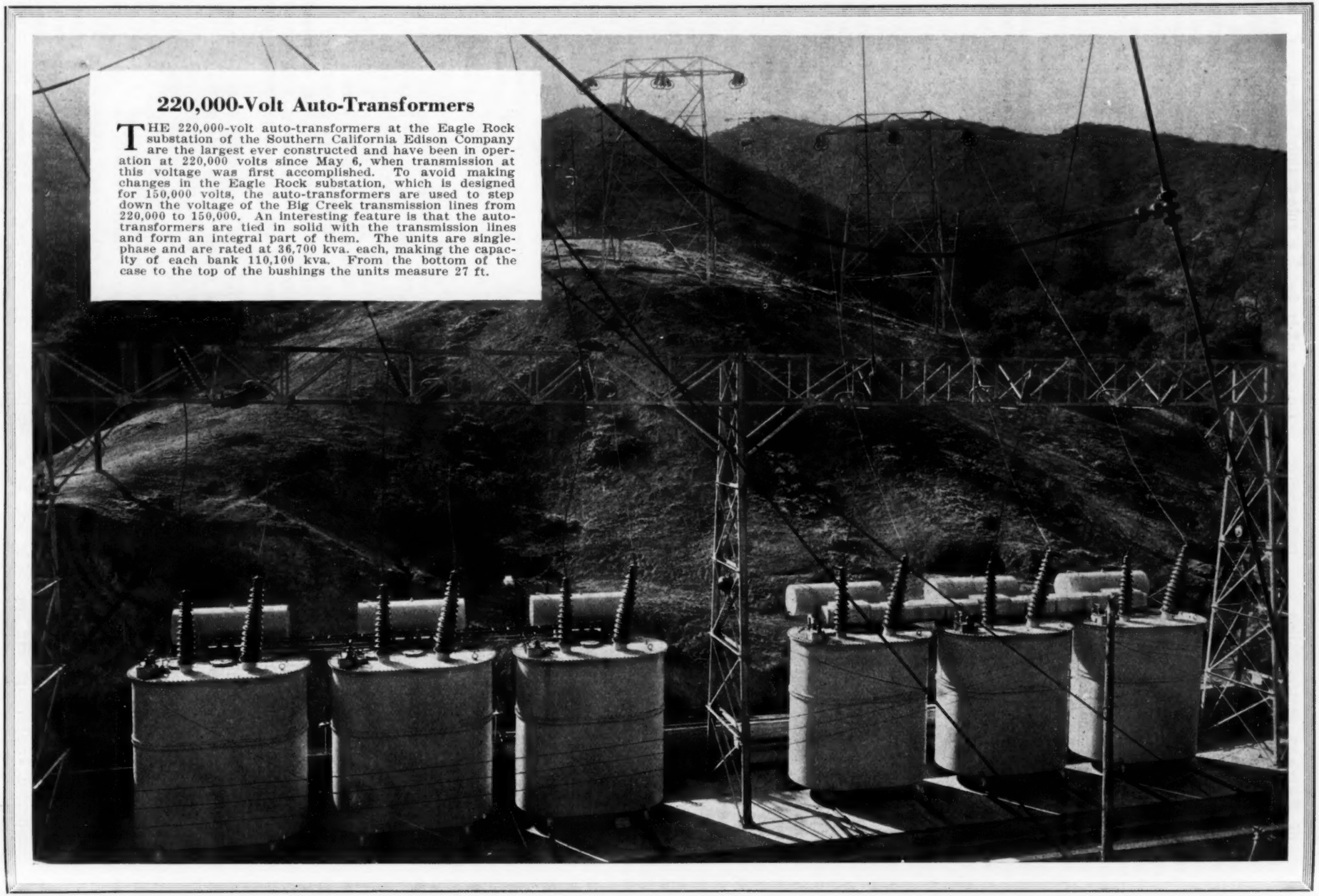
New Ideas That Advance Art

IN THE development of the 65,000-kva. turbo-generators briefly referred to on page 229, Dr. Robert Pohl, chief electrical engineer of the Allgemeine Elektricitäts-Gesellschaft, and his associates have produced an excellent design, original in conception and finished in execution. It is the kind of work that advances the art. However, some details of the construction appear to be so radical that it may be questioned whether they will survive.

One decided advantage of the construction is the considerable reduction in the size of the rotor forging made possible by dovetailing thereto packets of teeth punchings instead of cutting slots in the rotor. As a result many of the uncertainties inherent in large ingot forgings are eliminated. Since the rotor is assembled so as to produce stresses during building which are equal to or greater than the running stresses, the success of the structure depends largely on the quality and integrity of the workmen. Because of this demand for careful skilled workmanship, increased reliability in performance may be expected only if workmen of good quality are available. One imagines that post-war Germany cannot count on this as certainly as could pre-war Germany.

Another novel feature of the design is the use of band wire for holding the coil ends instead of the usual forged or rolled alloy-steel rings. Not every engineer will agree that the stress conditions described by Dr. Pohl (constant stresses at standstill and during running) are actually obtained. While the band-wire construction has some desirable features, particularly in the high quality of available material, the increased difficulties attending repair, as compared with a ring that may be pressed off, may serve to prevent its general adoption.

Dr. Pohl's reference to temperature rises by detectors should not be misunderstood. He points out that the generators have a single coil side per slot. With this winding arrangement the detector does nothing more than measure the tooth temperature. With the two-coil-per-slot winding universally used by American builders, the detector placed between coil sides more closely approaches the actual copper temperature. Temperatures obtained by measuring the increase in resistance of the armature winding are also of little value in large turbo-generators on account of the time taken for the rotor to come to rest and the cooling that occurs in the winding before the hot resistance is measured.



220,000-Volt Auto-Transformers

THE 220,000-volt auto-transformers at the Eagle Rock substation of the Southern California Edison Company are the largest ever constructed and have been in operation at 220,000 volts since May 6, when transmission at this voltage was first accomplished. To avoid making changes in the Eagle Rock substation, which is designed for 150,000 volts, the auto-transformers are used to step down the voltage of the Big Creek transmission lines from 220,000 to 150,000. An interesting feature is that the auto-transformers are tied in solid with the transmission lines and form an integral part of them. The units are single-phase and are rated at 36,700 kva. each, making the capacity of each bank 110,100 kva. From the bottom of the case to the top of the bushings the units measure 27 ft.

Self-Starting Synchronous Motors Get Service Test

Investigation Shows Pull-Out Torque, Power Input for Starting, Braking and Reversing, Speed of Stopping and Other Characteristics Important to Rubber-Mill Operation

By S. H. MORTENSEN
Electrical Engineer Allis-Chalmers Manufacturing Company

THE development in rubber-mill drives has been governed by a number of factors, chief among which are safety and efficiency of operation. The hazards assumed by workers operating rubber-mixing mills have been recognized and a series of devices have been developed and tried out for the purpose of stopping the mill rolls in the shortest time practicable when a worker is caught between the grinding rolls.

In the more recent rubber mills electric motor drives have for reasons of economy replaced the engines. With this class of installation it has been possible to effect a marked saving in the manufacturing cost, and at the same time the safety of operators has been materially increased. The motor is usually connected to the mill line shaft by means of a safety cut-off coupling which can be opened from any part of the mill by means of a suitable switching arrangement, thereby disconnecting the mill from the motor. In addition to this a powerful brake, acting on the mill side of the drive, is put into action when the clutch is opened from the emergency circuit. The magnetic clutch combined with a solenoid brake gives excellent service and can, when properly adjusted, bring the mill rolls to a stop within a fraction of a revolution The distance the rolls will travel after the emergency switch has been operated depends upon the load on the mills and upon the adjustments of the brake band and the condition of the braking surfaces. When the adjustment is perfect and the brake surfaces clean, a stop can be effected in a fraction of a revolution of the rolls. On the other hand, if the adjustment is imperfect or the brake surface greasy or dirty, it will be less effective. Upkeep and inspection of the brakes are therefore factors that should have careful consideration.

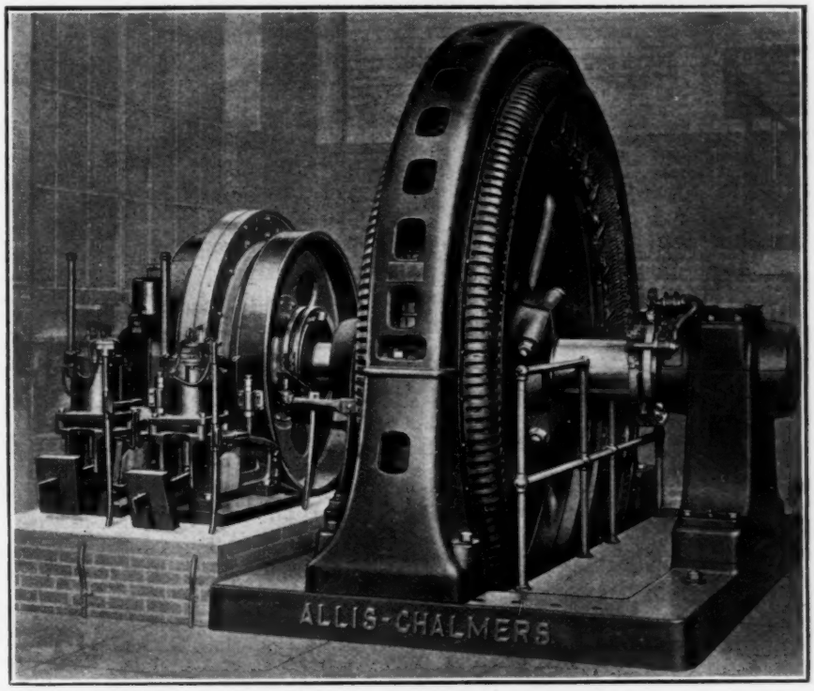


FIG. 1—1,000-KVA., 2,200-VOLT, 60-CYCLE, THREE-PHASE, 120-R.P M. SYNCHRONOUS MOTOR DRIVING MILL AT PLANT OF FIRESTONE TIRE & RUBBER COMPANY

It is equipped with a magnetic clutch and a solenoid brake which is put into action when the clutch is opened from the emergency circuit. The mills may be brought to a stop within a fraction of a revolution as compared with the older engine-driven installations, which may allow several revolutions of the rolls before coming to a stop. Threading of the rolls is also facilitated by this drive.

The majority of the motors applied for driving rubber mills are induction motors. These, on account of their rugged construction and simplicity of operation, give excellent service. Installations of this kind are, however, usually operated at a low power factor as the motors operate part of the time at fractional loads. This fact has a direct bearing upon the efficiency of the operation and cost of the product, and it led to the next step in the development of mill drives, namely, the application of the self-starting synchronous motor as a means for combating the evil effects of low power factor and thereby reducing the power cost involved.

CHARACTERISTICS OF SYNCHRONOUS-MOTOR INSTALLATION

A pioneer installation of this kind was undertaken by the Allis-Chalmers Manufacturing Company in 1918, when a 500-hp. self-starting synchronous motor with its switching equipment was installed for the B. F. Goodrich Rubber Company, Akron, Ohio. The motor in question replaced an induction motor and it was connected to the mill by means of a magnetic clutch. The mill was also equipped with a solenoid-operated brake. The procedure of operation is as follows: The motor is started with the magnetic clutch opened, which disconnects the mill. The starting voltage is obtained from the taps on an auto-transformer. After the motor is excited and brought into step upon the starting tap, it is quickly connected to the line and by energizing the magnetic clutch the mill is put into service. Provisions

are made so that the direction of rotation of the motor can be reversed in case it becomes desirable to back up the mill rolls.

As this was a novel application of the synchronous motor, it was deemed advisable to make a series of tests to make certain that the motor was suitable for this class of service. This test, records from which are reproduced herewith, included an attempt to pull the motor out of step. The load on the motor was provided by loading the four mills which it drives to their maximum capacity with the toughest rubber obtainable. As this did not pull the motor out of step, the magnetic clutch was tripped when the maximum peak load was reached. After the mill had come to a dead stop the clutch was re-energized, thereby suddenly applying a load of 1,090 kw. to the motor, which stayed in step. As the rated output of the motor is 372 kw., the peak load to which it was subjected was 2.9 times its rated value. This was the heaviest load which could be obtained and it was not considered practicable to pull it out of step. During these tests the motor-field excitation was unaltered from the value corresponding to its rated load.

As the tests and subsequent operation have proved this installation to be a complete success, the introduction of the self-starting synchronous motor in the rubber-mill industry is an accomplished fact. Characteristics of this motor are given in accompanying curves.

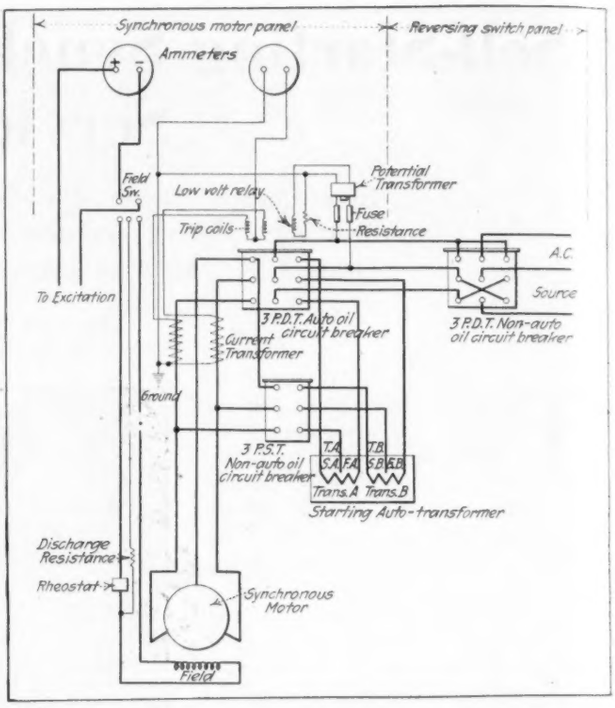


FIG. 2—CONNECTIONS AND SWITCHING ARRANGEMENT USED WITH SYNCHRONOUS MOTOR AT AKRON RUBBER MILL

SIMPLIFICATION AND MORE SECURITY IN NEW INSTALLATIONS

Further improvements have been made in a synchronous-motor-driven rubber mill recently put into operation in the Fisk rubber plant in Cudahy, Wis. The improvements are in the nature of simplification of the drive and additional security to the operators. These objects are accomplished by supplying a self-starting synchronous motor with characteristics that not only make it possible to omit the safety cut-out coupling between the motor and the mill but also make the auxiliary brake unnecessary as the motor itself may be used as a brake and will stop the mill effectively. The advantage of this feature from the safety point of view is apparent when it is borne in mind that the braking effect of the motor when once adjusted is constant, whereas the efficiency of the auxiliary brake depends upon its maintenance and may vary greatly.

Omitting the clutch makes it necessary for the synchronous motor to develop sufficient starting torque to operate the rubber mills under the severest load conditions. The motor is rated at 500 hp., 90 per cent leading power factor, 2,200 volts, three-phase, 60-cycle, and is coupled directly to the line shaft in a four-mill drive. It starts the mill from rest and brings it up to speed on reduced voltage. By exciting it it can be brought into step on the starting tap. After it is connected to the line the mills may be loaded.

In case of accidents when it becomes necessary to stop the mill, this can be accomplished by operating an emergency switch mounted on the respective mills. This disconnects the motor from the power supply and short-circuits it through a suitable resistance, bringing the motor to a sudden stop. By making suitable adjustments on the motor or the amount of resistance through which it is short-circuited, a wide range of adjustment with respect to the amount of travel of the rubber rolls in emergency cases can be obtained. Pro-

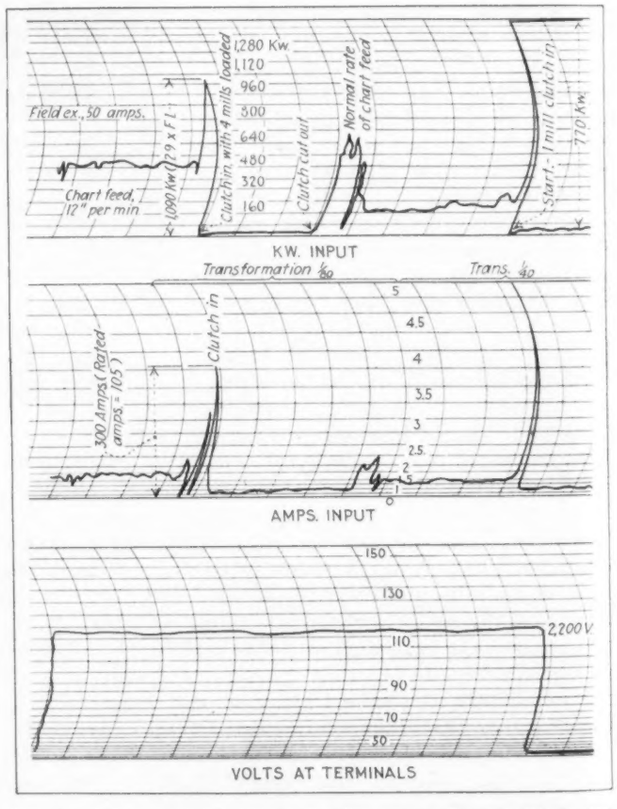


FIG. 3—ABILITY TO STAND UP UNDER HEAVY OVERLOADS WITHOUT PULLING OUT OF STEP IS A REQUIREMENT OF THE SYNCHRONOUS MOTOR IN RUBBER-MILL DRIVE

This diagram shows the result of a test on a 500-hp., three-phase, 2,200-volt, 60-cycle motor installed at Akron, Ohio. The motor was first loaded by putting the toughest rubber available through the four mills. The magnetic clutch was then tripped, and after the mills had come to a dead stop the clutch was energized, throwing a load of 1,090 kw. on a motor whose normal rated output is 372 kw. The motor-field excitation remained unaltered from the value corresponding to the full rated load and the motor remained in step.

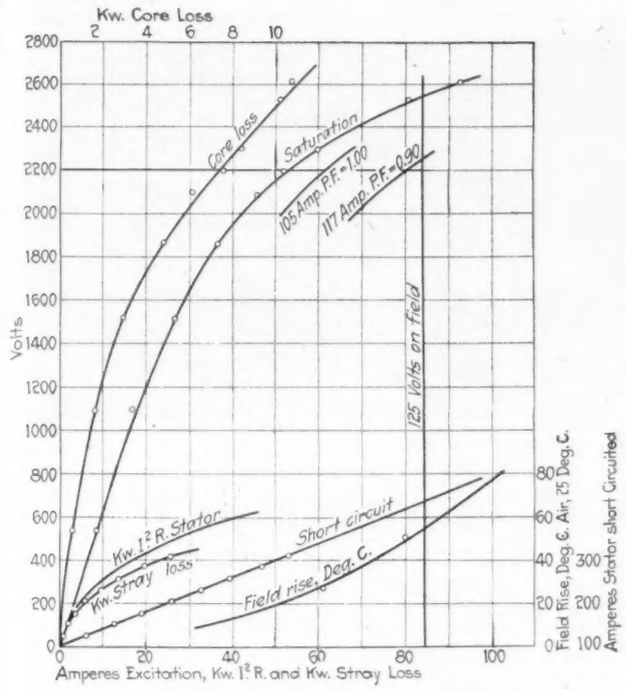


FIG. 4—CHARACTERISTIC OF 500-HP. SYNCHRONOUS MOTOR USED IN TESTS SHOWN IN FIG. 3

This refers to a 500-hp., 2,200-volt, 60-cycle, three-phase, 450-r.p.m. synchronous motor.

visions are made so that the direction of rotation of the rubber mills can be reversed. Graphical records are shown of the power input to the motor when it drives four rubber mills fully loaded and during one of the starting, braking and reversing tests.

On account of the novelty of this installation, it has been tested very thoroughly and is found capable of meeting all the requirements that may arise in a rubber-mill drive of this kind. The starting records indicate that with reduced starting voltage the motor would have ample torque to operate the mill under normal conditions. It was, however, decided to leave the taps as they were to insure ample torque in case of emergency, when it becomes necessary to back a heavy load of crude rubber out of the mills.

The tests also showed that the motor brought the loaded rubber mill to a stop in one-fifth of a turn of the rolls. By adjusting the resistance through which the motor is short-circuited the travel of the roll was reduced to less than one-sixth of a turn. During this test the mills were partly loaded. A repetition of the test with the mills empty showed that a stop was effected in less than one-fourth of a turn of the 22-in. mill roll. For the sake of comparison, two different induction-motor-driven mills, each equipped with magnetic clutch and solenoid-operated brakes, were stopped by tripping the emergency switch. Both mills were lightly loaded during this test, and they did not stop as quickly as the rolls stopped by dynamic braking.

Synchronous motors of standard design should not be applied for direct connection to rubber mills as their design and characteristics are not such as to meet the starting and reversing requirements without overheating. It is necessary that such motors be of particularly rugged mechanical design to meet the shocks occurring during the braking period. Owing to the reduction in first cost of installation and also of inspection and upkeep arising from the elimination of the magnetic clutch and solenoid-operated brakes, to the increase in efficiency and improvement in operation inherent in synchronous motors operating at unity or leading power factor, as compared with induction-motor installations, and, last but not least, to the increased security afforded the operators because of the efficient and consistent emergency stopping obtainable by dynamic braking, the synchronous motor will unquestionably make this type of installation very popular in grinding-plant extensions as well as in new rubber-mill installations.

Bureau of Standards Studies Street Lighting

THE Bureau of Standards is making a study of the various systems of street lighting used in cities and towns throughout the country. This work is now well under way and is receiving the hearty co-operation of municipalities and operating utilities. Several hundred replies to questionnaires on engineering practice and contract requirements have been received and are being carefully analyzed.

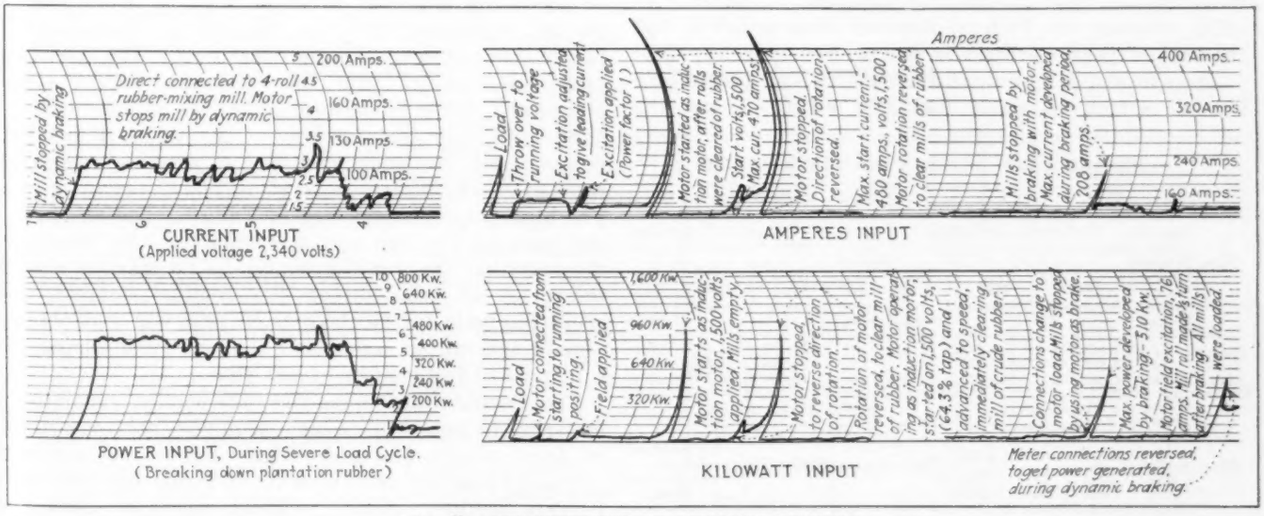
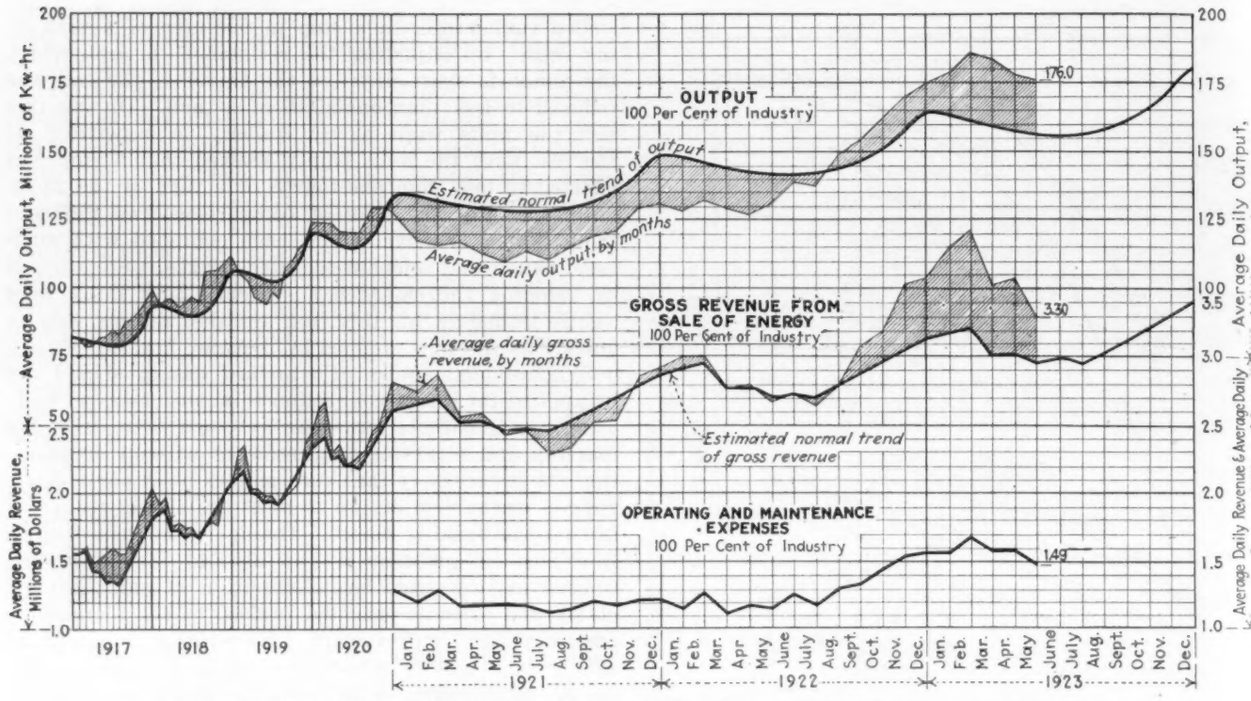

Direct connected to 4-roll rubber-mixing mill. Motor stops mill by dynamic braking.
Mill stopped by dynamic braking
200 Amps.
160 Amps.
130 Amps.
100 Amps.
CURRENT INPUT
(Applied voltage 2,340 volts)
Amperes
400 Amps.
320 Amps.
240 Amps.
160 Amps.
Load
Throw over to running voltage
Excitation adjusted to give leading current
Excitation applied (Power factor 1)
Motor started as induction motor, after rolls were cleared of rubber.
Start. volts 1,500
Max. cur. 470 amps.
Motor stopped.
Direction of rotation reversed.
Max. start. current 400 amps., volts 1,500
Motor rotation reversed to clear mills of rubber
Mills stopped by braking with motor.
Max. current developed during braking period. 208 amps.
AMPERES INPUT
800 Kw.
640 Kw.
480 Kw.
400 Kw.
320 Kw.
240 Kw.
200 Kw.
POWER INPUT, During Severe Load Cycle.
(Breaking down plantation rubber)
1600 Kw.
960 Kw.
640 Kw.
320 Kw.
Load
Motor connected from starting to running position.
Field applied
Motor starts as induction motor, 1,500 volts applied. Mills empty.
Motor stopped.
Rotation of motor reversed, to clear mill of rubber. Motor operating as induction motor, started on 1,500 volts, (64.3% tap) and advanced to speed, immediately clearing mill of crude rubber.
Connections change to motor load. Mills stopped by using motor as brake.
Max. power developed by braking 510 Kw.
Motor field excitation, 76 amps. Mill roll made ¼ turn after braking. All mills were loaded.
KILOWATT INPUT
Meter connections reversed, to get power generated, during dynamic braking.

FIG. 5—EFFECTIVENESS OF DYNAMIC BRAKING

Tests with 500-hp., 60-cycle, 2,200-volt, three-phase, 450-r.p.m. synchronous motor using dynamic braking installed in the Fisk rubber plant at Cudahy, Wis., which show the ability of the motor to stand up under severe conditions. The short charts show the current and power input to the motor with the four rubber mills fully loaded. The longer charts show the current and power input to the motor during one of the starting, braking and reversing tests.



THE CENTRAL STATION OUTPUT DURING MAY WAS 12.4 PER CENT ABOVE NORMAL, AND THE GROSS REVENUE WAS 11.8 PER CENT ABOVE NORMAL

May Output About 12 per Cent Above Normal

REPORTS received by the ELECTRICAL WORLD for the month of May from central generating and distributing companies representing 74 per cent of the installed generator rating of the country indicate that the average daily output was slightly lower than that reported for April. Such a drop during May was to be expected, due to the advancing season and consequently decreased lighting requirements, with no unusual general increase in industrial activities.

A carefully worked out "normal trend of output and gross revenue" is presented in the accompanying diagram. This "normal trend" is based upon extensive studies made by the Federal Reserve Bank of New York City, with the exception that the rate of growth of the industry has been assumed as constant subsequent to 1917, whereas the Federal Reserve Bank believes that the rate of yearly growth is decreasing.

The average daily output during May was 175,987,000 kw.-hr., which is about 1,483,000 kw.-hr. below the figure reported for April. This output for May was 12.4 per cent above what would have been the seasonal energy requirement if growth in the industry had been normal, as indicated on the accompanying chart. A growth of 22.3 per cent in output is indicated over May of last year.

The average daily revenue from sales of energy during May was $3,303,000, which was about 8 per cent below the revenue reported for April. The decreased energy requirements of the high-revenue domestic lighting customers was the direct cause for this drop in revenue. This revenue, however, is 11.8 per cent above what would have been the revenue if growth in the industry had been normal. A growth of 20 per cent in gross revenue is indicated over May of last year.

Expressing the financial phase of the returns for the month of May in terms of the operating ratio, or ratio of operating expenses to gross revenue from sale of energy, indicates that the industry is financially in better shape than at this time last year. The operating ratio reported for May by companies having steam plants only, taken in the aggregate, was 51.3 per cent, as against 52.5 per cent for May of last year. It must be remembered that with May of last year the operating ratio of steam electric generating plants began to rise. The high point was reached in August when an operating ratio of 56.6 per cent was reported. By reason of the fact that there will probably be no marked rise in the price of coal during the coming summer, the operating ratio during the present year will undoubtedly remain several per cent below that recorded during the summer and fall months of last year.

The Pacific States were the only section reporting a material increase in energy requirements over those of April, which was undoubtedly due to the seasonal increase in energy requirements of irrigation customers in this section. Other sections reported operations about on a par with April except the North Central Section, which indicated a decreased consumption of about 3.6 per cent.

CENTRAL-STATION RETURNS FOR THREE MONTHS

Mos.	Percentage of Installed Ratings Represented	Kw.-Hr. Output (Companies Reporting) 1923 Thousands	1922 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	Revenue from the Sale of Energy (Companies Reporting) 1923 Thousands	1922 Thousands	Per Cent Increase
Mar....	72	4,118,713	3,241,293	27.0	68	$74,158	$61,492	20.6
April..	73	3,886,794	3,071,879	26.5	68	73,124	60,892	20.1
May..	74	4,037,192	3,300,572	22.3	69	70,674	58,899	20.0

Mos.	Percentage of Installed Ratings Represented	Operating and Maintenance Expenses (Companies Reporting) 1923 Thousands of Dollars	1922 Thousands of Dollars	Per Cent Increase	OPERATING RATIO Steam Plants 1923	Steam Plants 1922	Hydro Plants 1923	Hydro Plants 1922	Combined Systems of Steam and Hydro 1923	Combined Systems of Steam and Hydro 1922
Mar....	56	27,368	22 293	22.8	46.8	48.3	23.6	27.1	42.5	40.7
April..	56	26,249	21,265	23.4	48.2	49.0	30.8	28.8	44.7	42.0
May..	57	26,366	21,902	20.3	51.3	52.5	29.4	25.6	44.2	43.5

Department Store Illumination

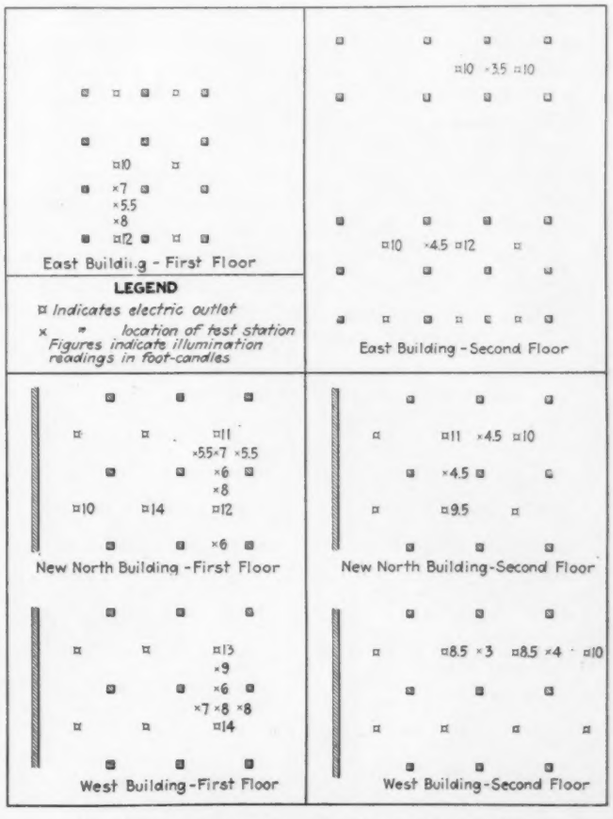
Building Committee of Joseph Horne Company Made Extensive Investigation Before Reaching Decision—Appearance, Diffusion, Distribution, Light Quality and Maintenance Have Special Consideration

THE best illumination which money could buy was sought by the Joseph Horne Company when it undertook an extensive addition to its department store in Pittsburgh, which has just been completed. The company was interested not only in harmonious appearance but in true economy. Illumination was desired that would carry with it the most effective sales atmosphere. The light must be without glare and show the patterns on white linen. Furthermore, it had to liven up the colors of an infinite variety of fabrics to be displayed. Above all, the light had to be such that wearing apparel would appear at its best.

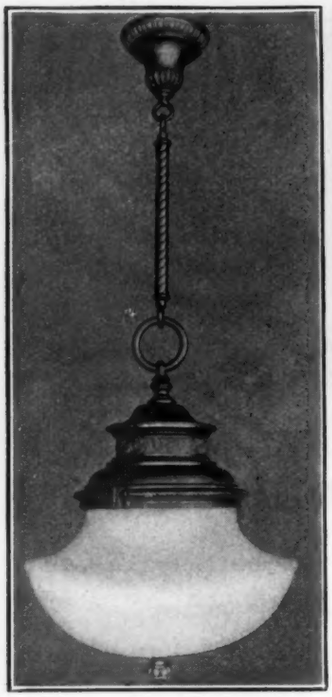
Not only were two prominent architects engaged—Benno Janssen and W. Y. Cocken, Jr.—but also a well-known store-equipment expert—C. A. Wheeler. An opportunity was given to every manufacturer of lighting equipment to submit designs and guarantees. In addition to this, the building committee, which was formed to consider various plans submitted, visited other large cities to observe the lighting effects in various department stores.

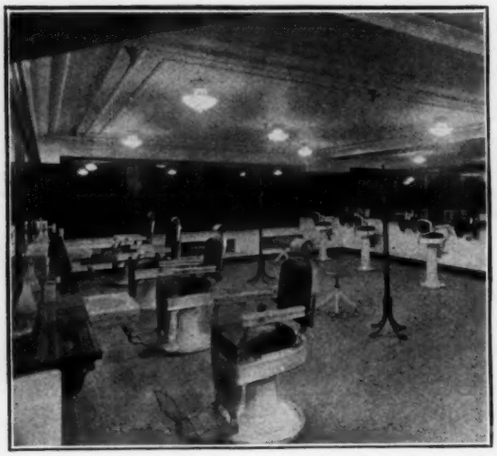
Basing its conclusions on previous experience and the results of the study mentioned, the building committee decided that the first floor should be the most brightly illuminated to attract attention from the street and avoid what often appears to be gloom to a customer stepping from the daylight into a poorly lighted store. With the ceiling heights and dimensions of bays existing in this store it was considered necessary to use 750-watt units to obtain the intensity desired. Diffusion thus became the first problem. As the result of considerable experiment 20-in. diameter was selected as the minimum size of bowl which could be used without insufficient diffusion, but for appearance's sake, one of a little larger diameter—namely, 23 in.—was chosen for the main and second floors.

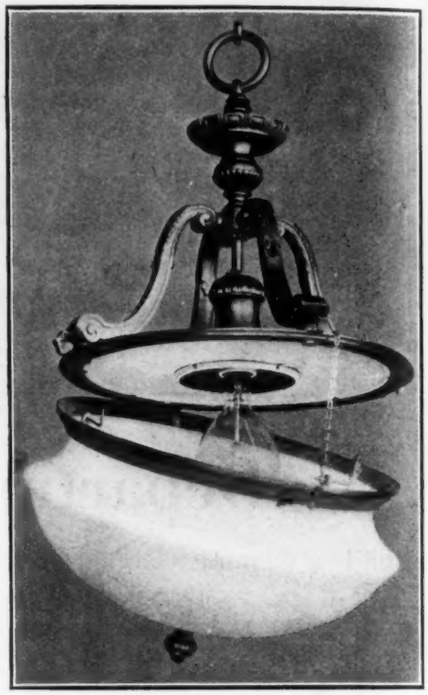
Various types of glassware were considered as to diffusion, light absorption, quality of light and so forth. Of these various grades of glassware "Celestialite" was looked upon with greatest favor, but there was a question at first whether its light absorption was not too great. To answer this question H. S. Whiting, the advocate of this glass and manufacturer of the luminaires, had tests conducted and it was shown to be 4 per cent less efficient than one other prominent make of glassware (see accompanying test), but it was contended that the quality of the light offset this lower efficiency. The question was finally answered in favor of "Celestialite" when colored fabrics were laid on a horizontal surface and a vertical partition placed over them in such a position that light from ordinary glass and light from color-corrective glass illuminated opposite halves of each fabric.


East Building - First Floor
LEGEND
¤ Indicates electric outlet
× " location of test station
Figures indicate illumination readings in foot-candles
East Building - Second Floor
New North Building - First Floor
New North Building - Second Floor
West Building - First Floor
West Building - Second Floor

FOOT-CANDLE INTENSITIES AT 30-IN. ABOVE FLOOR IN DIFFERENT SECTIONS OF STORE







Three Methods of Supporting Luminaires

The fixture shown on the right was selected for use on the main and second floors, where artistic appearance and character of light distribution were most important. In sections where ceilings were low, as in the barber shop, a similar but smaller bowl was attached next to the ceiling. Elsewhere the fixture shown at the left was used. All of the luminaires have three-layer cased-glass bowls and hinged supports, permitting cleaning and replacements. To remove the bowl, withdraw pin in hinge.

With a 750-watt lamp hung in a bowl of this glass it was found that more desirable light distribution could be obtained by employing an enameled-steel reflector in a plane with the upper edge of the bowl. In fact, the downward illumination could be increased 15 to 25 per cent in this way. In the first experiments which were conducted with the reflectors holes were provided in the reflector to allow some upward illumination, but they were found to be unnecessary because the spacing of the fixtures and the shape of the bowl (see accompanying illustration) were such that enough light was directed at the ceiling without the holes to give a good effect.

As many as twenty to fifty drawings and models of specially designed hangers for these bowls were submitted by H. S. Whiting for comparison. The design finally adopted for the main floor was a relatively heavy casting. As shown in the accompanying illustration, the lower end of the lamp socket is supported about flush with the enameled-metal reflector. A split band is used to hold the bowl. Being hinged at one side and equipped with a safety chain at the opposite side, it can be swung down sufficiently to permit cleaning the inside of the bowl and the reflector and also changing the lamp. If it is necessary to take down the entire bowl for any reason, such as replacement, a pin can be withdrawn from the hinge and the bowl lowered onto a padded barrel. When the bowl is in the closed position a pin can be inserted through a hole in a tongue cast in the band on the opposite side from the hinge.

To improve the appearance of the unit an ornamental knob is attached to the lower side of the bowl. In this is a hole which, together with small holes in the reflector, permits a sufficient passage of air through the bowl to ventilate it without admitting too much dust.

These fixtures cost the Joseph Horne Company about $100 apiece, and the company's willingness to pay this price indicates the increasing importance that illumination is gaining in the minds of merchants.

Similar-shaped bowls with ornamental knobs were used on the other floors, but these were smaller in diameter, namely, 20 in. In the barber shop on the men's floor, for example, the bowls were supported in cast rings next to the ceiling. On other floors where the ceiling was higher a fixture like that shown above at the left was used. In all of these a hinged split band was used for clamping the bowl to facilitate cleaning and removal.

After the installation was completed illumination tests were made on the first and second floors to ascertain the foot-candle intensities obtained.

As explained before, the luminaires consisted of pendent inclosing globes of "Celestialite" three-layer cased glass (Gleason-Tiebout No. 5692, 23-in. diameter). The units, as indicated on the accompanying drawings, were situated in the center of each bay in the north and west sections of the building and down the center of the aisles on 24-ft. centers in the east section. In the case of the first two sections the typical bay was 23 ft. x 24 ft., or 552 sq. ft. in area. In the east section the aisles in which the reading were taken were 20 ft. wide, giving 480 sq. ft. to each unit.

The ceiling and mounting heights (measured from floor to bottom of globe) were as follows:

FEATURES OF LIGHTING INSTALLATION

All fixture dimensions are to bottom of glassware. A 4-in. round box is used in every instance.

Quantity of Fixtures	Building	Floor	Ceiling Height (Ft. and In.)	Fixture Length (Ft. and In.)	Height Above Floor (Ft. and In.)	Stud (In)	Center Stem Ornament
35	West–Old	1st	22 0	9 9	12 3	4	Yes
18	West–New	1st	22 0	9 9	12 3	4	Yes
25	East–Old	1st	20 5	8 2	12 3	4	Yes
5	East–Old	1st	20 1 (on beams)	7 10	12 3	4	Yes
35	West–Old	2nd	17 9½	6 5½	11 4	4	No
40	West–New	2nd	17 0	5 9½	11 2½	4	No
30	East–Old	2nd	17 1 to 17 5½	*	11 4	4	No
6	East–Old	2nd	16 10 to 17 1½ (on beams)	*	11 4	4	No
34	East–Old	3rd	15 8½ to 16 2	*	10 0	4	No
2	East–Old	3rd	15 7 (on beams)	5 7	10 0	4	No
36	East–Old	6th	13 6	4 3	9 3	4	No

* Electric plan necessary with height at each outlet.

Location	Celing Height (Ft.)	Mounting Height (Ft.)
First floor	22	12½
Second floor, north and west sections	18	11½
Second floor, east section	17½	12½

Each of the luminaires on the first floor was equipped with a clear 750-watt, 115-volt "PS-52 Mazda C" lamp, and those on the second floor were furnished with a clear 500-watt, 115-volt "PS-40 Mazda C" lamp. The walls and ceilings were finished in a glossy white and were fairly clean.

Illumination readings were made with a foot-candle meter at the positions indicated on the accompanying drawing. The instrument was placed on a table 30 in. high and all readings were made at this level. At the various positions the illumination was read independently by four observers and the average was recorded. Voltage readings were taken at the socket of one of the luminaires and were found to be so close to the voltage rating of the lamps and to remain so nearly constant that the effect on the illumination would not have been measurable.

The foot-candle readings for the various stations are recorded at their respective positions on the accompanying drawings. The average values of illumination on these two floors are as follows: First floor—12 foot-candles directly beneath luminaires and 6 foot-candles directly between luminaires; second floor—10 foot-candles directly beneath luminaires, and 4 foot-candles directly between luminaires.

These tests were made by the Illuminating Engineering Bureau of the Westinghouse Companies.

Comparisons of the efficiency of the glass selected for the globes with another well-known single-layer white diffusing glass are given below:

Type of Globe	Weight in Grams	Light Output in Percentage of Bare Lamp
Single-layer globe	1,443	79
"Celestialite" globe, No. 5920	1,479	75

In making this light-output comparison the incandescent lamp was placed with the filament approximately ½ in. above the globe center and the top of the globe covered with white blotting paper. The light center was 3¾ in. below the top of the globe. In each case a 150-watt ring-filament, clear-bulb lamp was used and the measurements of light output were made with an integrating sphere. The tests were made by the Electrical Testing Laboratories.

Signal Systems for Power Stations

Recent Practice in Providing for Various Alarm Signals Inside and Outside the Switchboard Room and for Operating Instructions as Well as General Communication—Not Too Elaborate but Still Adequate

By C. D. GRAY and M. M. SAMUELS
The J. G. White Engineering Corporation, New York

ALTHOUGH little attention was paid to signals in the older type of small power houses, it is rapidly becoming recognized that these important nerves of a power plant cannot be overlooked in modern design. Besides the customary signals in the switchboard room and general communication, provision must be made for calling the operator's attention to trouble in different pieces of apparatus and circuits, protection must be afforded against personal and equipment hazard, and intercommunication has to be provided between switchboard attendant, turbine operator, boiler foreman and other employees who must be kept in contact.

EXTREMES SHOULD BE AVOIDED

Care must be exercised not to go from the one extreme of totally neglecting the question of signals to the other extreme of providing an over-elaborate system which will require too much care and attention. Particular care must be taken not to burden the switchboard panels themselves with too many unnecessary devices. It is not advisable to have an annunciator in the switchboard room giving a record of each individual oil switch, since this would only cause unnecessarily complicated wiring and would furthermore take the operator's attention away from the board where it should be. Neither is it necessary to provide three indicating lamps on the panel for each oil switch, one red showing when switch is closed, one green showing when the oil switch is temporarily open and one blue showing when switch is out of service. Such a multiplicity of lamps would tend only to complicate the wiring and to crowd the panel and increase the length of the control board. All are agreed that the tendency should be toward simple and short control boards.

CONTROL SWITCH SHOWS LAST OPERATION

A mechanical indicator on the control switch to show the last operation performed by the operator can take the place of the third lamp. There is at least one make of switch (Fig. 1) having a mechanical indicator which is both reliable and distinct and which also has the advantage that the position of the handle clearly indicates the last operation which has been performed by the operator.

The other extreme of disconnecting both lamps when the switch is not operating is dangerous since it is possible for a lamp to burn out, in which case the circuit would be thought of as not operating. Thus it is clear that the best signal for the individual circuit-breaker control on the panel is one red and one green lamp, one of which is always burning, combined with a control switch having a reliable and easily distinguishable mechanical indicator.

A well-balanced indicator system for a switchboard room taking care not only of the oil-switch alarm but likewise of the transformer alarm, telephone, etc., requiring only one bell (and one spare bell which can

be thrown on when the main bell fails on test) is shown in Fig. 2. For this system the oil circuit breakers of the station can be subdivided into as many groups as desired and a signal provided on the annunciator for each such group, such as "main switching No. 1," "main switching No. 2," "auxiliary switching," etc. All that is required on the switchboard is one bell-alarm relay for each group, actuated in the well-known manner when any of the oil switches belonging to this group trips, and being equipped with three contacts, one common, one for the bell and one for the annunciator sign. On the same signboard can be accommodated transformer alarm, telephone calls, etc., for which purpose the necessary relays can be accommodated within the signboard. It is difficult to obtain a transformer thermometer with three contacts, and the diagram therefore shows a relay for each transformer and a common relay for all transformers. The bell generally furnished with each telephone is omitted and a small relay substituted. This relay likewise is generally furnished with only one pair of contacts, and an additional relay with three contacts is therefore shown on the diagram for each telephone. A multipole test switch is provided which can be closed daily for a moment and which will at once show any fault in the connections, fuses, relays, lamps or bell. No doubt relays with three contacts as well as transformer thermometers with three contacts will soon be developed, which will reduce the number of relays on the annunciator to a minimum.

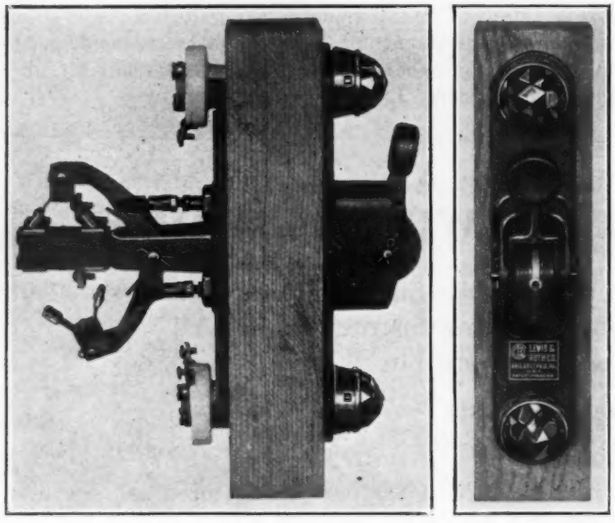


FIG. 1—CONTROL SWITCH THAT INDICATES LAST OPERATION

For communication between the switchboard man and the turbine man the majority of older power houses have a pedestal near each turbine equipped with about six signal lamps operated from push-buttons on the switchboard and a number of push-buttons to operate return signal lamps on the switchboard. This system is both too complicated and requires too much space. Furthermore, it is a difficult matter to place the pedestal in the turbine room so that the man at the throttle can see it, and the throttle man has to delegate to a helper the operation of the return signals.

PLUG-IN PORTABLE TELEPHONE FOR TURBINE ROOM

A system of communication which requires neither lamps on the switchboard nor obstructive and unsatisfactory pedestals in the turbine room and which is always within reach both of the switchboard operator and the turbine operator is shown diagrammatically in Fig. 4. A large signboard is provided on the turbine-room wall giving the unit numbers, and all there is on the switchboard is a double-pole push-button on each generator panel. When the switchboard operator requires the turbine man to go to a certain unit for starting up or other purposes, he pushes the button on the respective generator panel which both sounds a "howler" in the turbine room and shows in large illuminated letters the unit number to be attended. The switchboard room is equipped with an outfit for loud speaking and loud receiving, this being possible because there is generally very little noise in a modern switchboard room. A combined head and breast set is

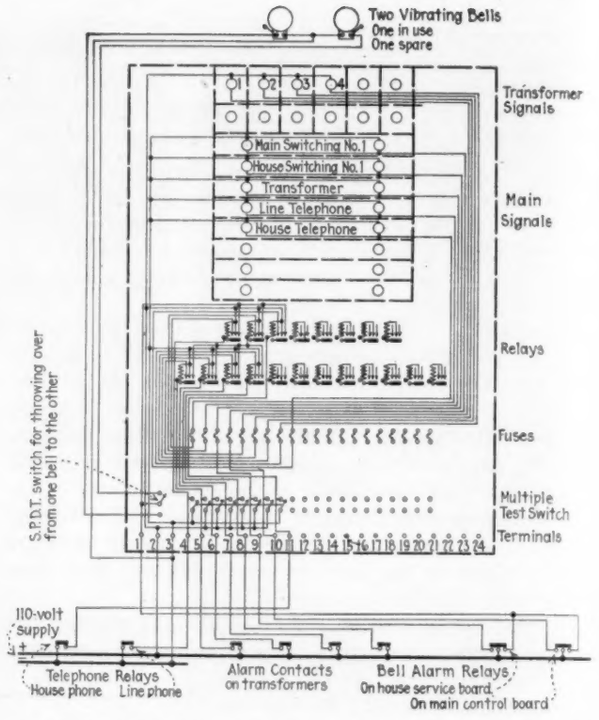


FIG. 2—CONNECTIONS OF ANNUNCIATOR FOR SWITCHBOARD ROOM, MAKING IT POSSIBLE TO USE ONLY ONE BELL FOR ALL PURPOSES

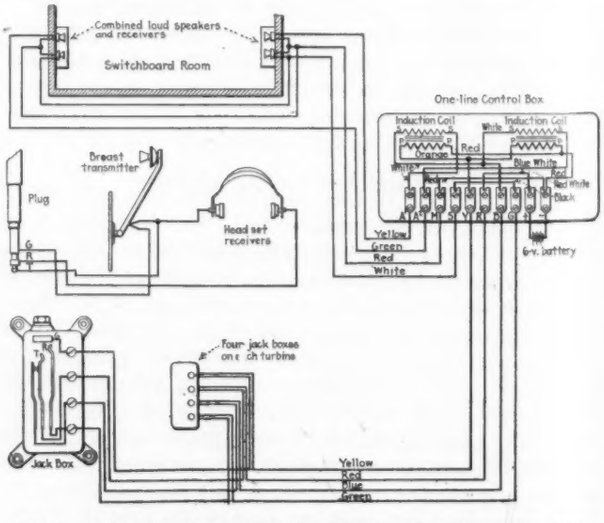


FIG. 4—CONNECTIONS FOR LOUD-SPEAKING TELEPHONE COMMUNICATION BETWEEN SWITCHBOARD MAN AND TURBINE-FLOOR MAN

available at each turbine unit, which can be plugged to any one of several jacks near the throttle. Thus a system of communication is established between switchboard room and turbine room, simple, unlimited in scope, requiring no operating of push-buttons and return buttons, and accomplished by means of four telephone wires. It is advisable to provide two signboards in parallel, one at each end of a long turbine room.

In large steam plants it is often advisable to treat the auxiliary load as if it represented customers and to establish substations in various parts of the plant to supply groups of motors for important auxiliary demands. The turbine-room basement, for instance, will generally have a great many motors, such as those for circulating pumps, condensate pumps, house pumps, etc. One or more auxiliary substations will generally be established in the turbine-room basement for the purpose, not directly under the control of the switchboard operator, but under the direct supervision of the pump man, whose attention must be directed to any motor which may trip out. For this purpose a headquarters is established in the basement for the pump man, where a signboard similar to the one in the switchboard room is provided, equipped with bell and test switch and indicating the group of motors one of which tripped. The individual motor affected can be determined by the handle of the respective circuit breaker on the auxiliary substation, which is generally hand-operated. The telephone signal for the pump man can likewise be taken care of on this signboard.

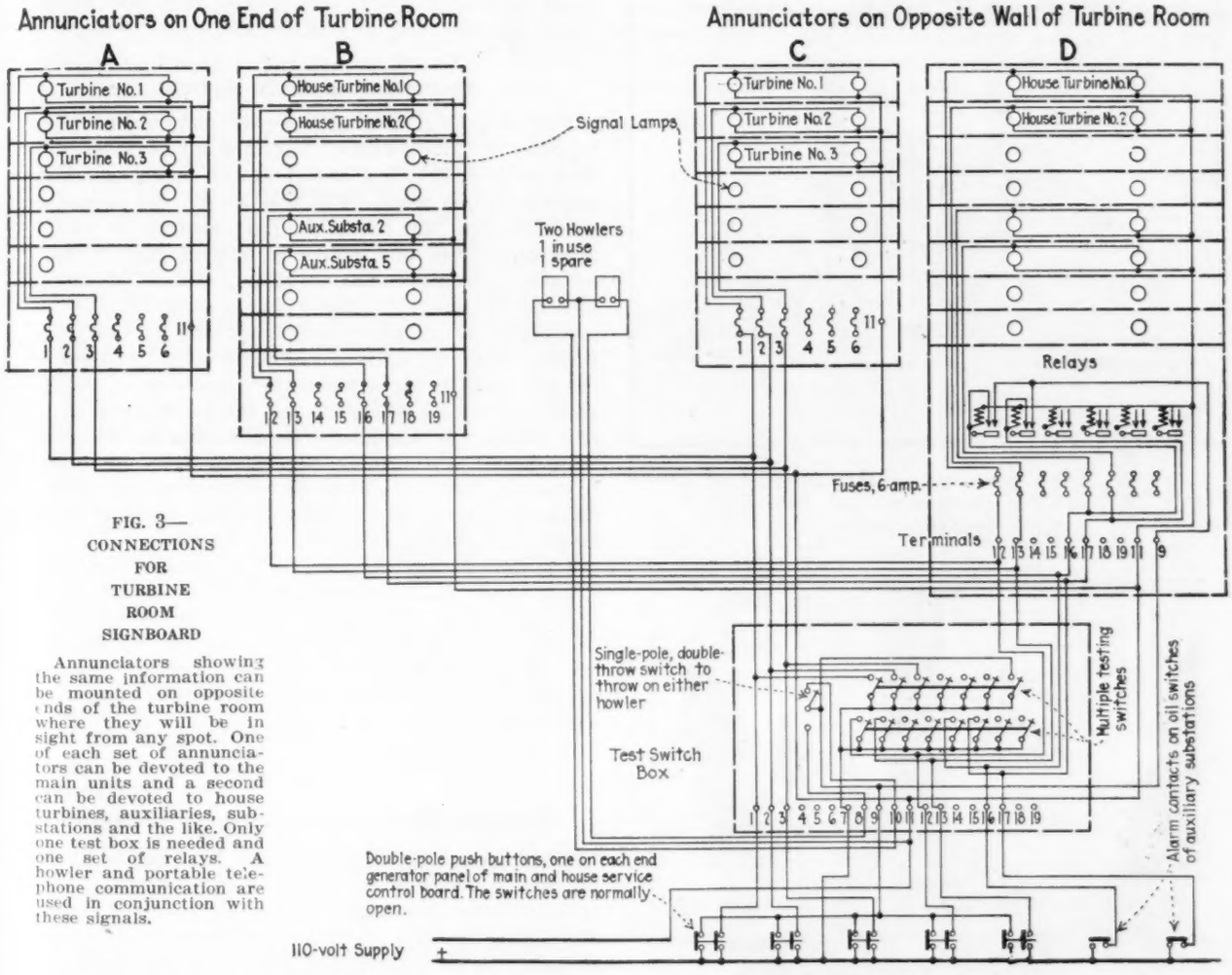


FIG. 3—CONNECTIONS FOR TURBINE ROOM SIGNBOARD

Annunciators showing the same information can be mounted on opposite ends of the turbine room where they will be in sight from any spot. One of each set of annunciators can be devoted to the main units and a second can be devoted to house turbines, auxiliaries, substations and the like. Only one test box is needed and one set of relays. A howler and portable telephone communication are used in conjunction with these signals.

AUTOMATIC TELEPHONE FOR GENERAL COMMUNICATION

For general communication between the various operating men in a large power house the best that can be provided is an automatic telephone for direct calling by the well-known dial method, which is more satisfactory than the ordinary intercommunicating telephone. It allows for extension, is very reliable in operation, requires only one pair of wires per telephone and requires no push-buttons for calling. It is advisable to provide a "conference call" attachment, which allows the chief engineer to talk to all the operators in the stations and thus facilitates the issuing of general instructions, warnings or alarms.

Another feature for signaling in a large steam plant is the necessity to keep the boiler man informed of the existing load and, what is more important, to advise him of the expected load in order to enable him to have additional boilers ready when necessary. A very reliable system of communication for this purpose consists of a 24-in. diameter indicator installed in the fireroom and equipped with dial and two hands, one pointing at the existing load and the other at the expected load. The switchboard operator sets these two hands electrically from his desk by means of two small handles on a transmitter box, ringing a bell in the fireroom every time he changes the setting. The large

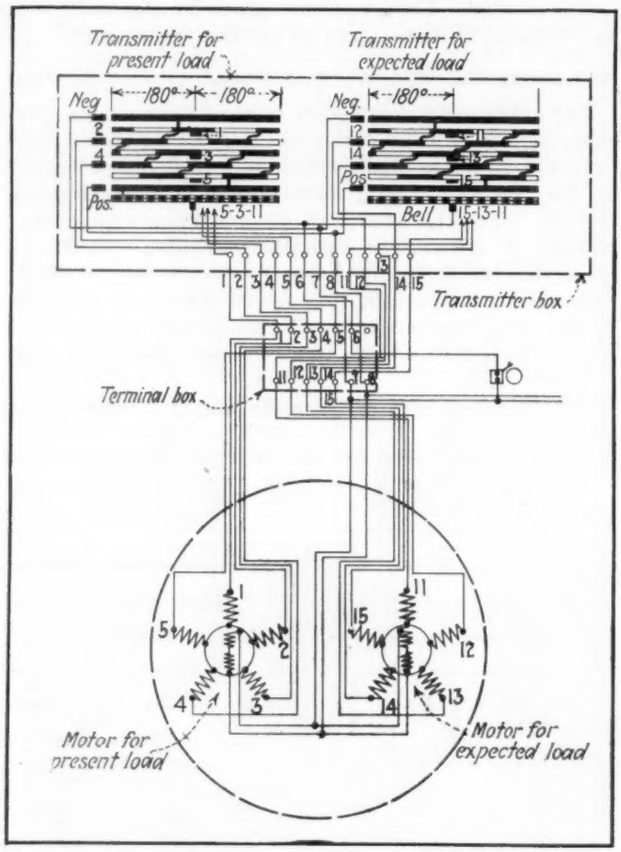


FIG. 5—CONNECTIONS FOR ADVISING BOILER MAN OF EXISTING AND EXPECTED LOAD FROM SWITCHBOARD ROOM

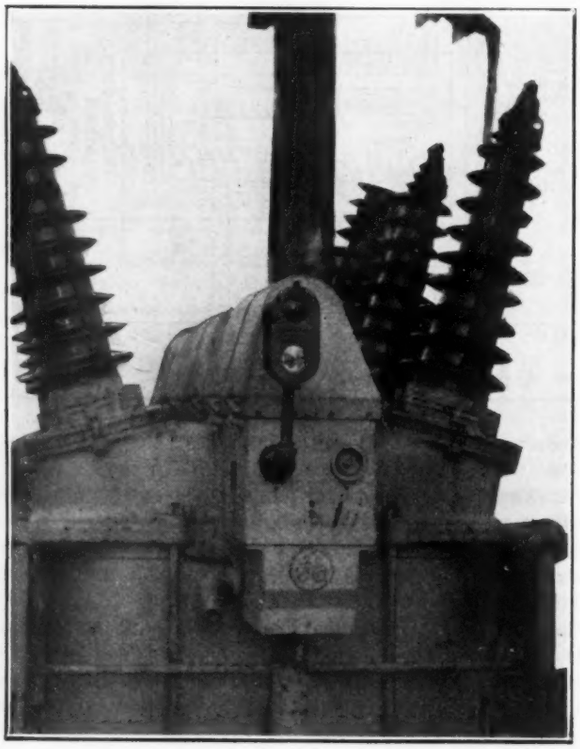


FIG. 6—SIGNAL BOX WITH RED AND GREEN SEMAPHORE LENSES MOUNTED ON TRANSFORMERS AND OTHER APPARATUS TO SHOW WHETHER EQUIPMENT IS ENERGIZED

dial on the fireroom indicator is illuminated and can be read from a great distance. The operation is accomplished by means of small motors which operate in perfect synchronism with the transmitters, so that they immediately resume their relationship upon resumption of their power feed, even though the pointers have drifted away while power was off.

Most of the large modern power houses have totalizing graphic wattmeters, and a system has recently been worked up whereby any number of totalizing indicating wattmeters can be operated at remote points from this totalizing graphic meter. When this system is used, the indication of the existing load in the fireroom can be accomplished automatically by means of such a totalizing indicating wattmeter with a large dial, and the signaling has only to advise the boiler man of the expected load.

TELLTALE LAMPS ON EQUIPMENT

The switching of a large power plant cannot always be done in "single-track" way, and oil switches, transformers and lightning arresters can be energized from more than one point. For this reason the danger ever prevails that an operator disconnecting a piece of apparatus from one source of energy may think the apparatus dead even though it may still be connected to another source. It therefore becomes necessary to provide a red and green indicating lamp on every transformer, lightning arrester, large oil circuit breaker, etc., the red lamp to light when the apparatus is energized from any source whatever and the green lamp to light only when the apparatus is disconnected completely. Such a box is shown in Fig. 6. It is of neat design having one red and one green semaphore lens, 2½ in. in diameter, and a hinged door, so that there is no possibility of interchanging red and green.

The devices described are being installed in the Pine Grove power plant of the East Penn Electric Company. The signboards and signal boxes are being supplied by Charles Cory & Sons, the loud-speaking telephone by the Callophone Company and the automatic telephone by the Automatic Electric Company. The power house was designed and constructed by the J. G. White Engineering Corporation.

British Electricity Supply Statistics

THE Electricity Commissioners have issued analyses and summaries of the fuel consumption and the kilowatt-hours generated during the year ended March 31, 1922, by 536 electrical undertakings in Great Britain. A new form has been adopted in which to present these statistics, classifying them into districts on the lines of the electricity districts determined by the commissioners. No very satisfactory comparison is thus possible with the figures given last year.

Steam stations (396) generated 4,732,000,000 kw.-hr., with an average consumption of 3.11 lb., the highest thermal efficiency of any such plant being 17.2 per cent; gas-producer stations (60) generated nearly 15,000,000 kw.-hr. on an average consumption of 2.64 lb. each and with a maximum thermal efficiency of 15.12 per cent. and oil-engine stations (52) generated 31,500,000 kw.-hr., using 2.08 lb. of oil per unit and displaying a maximum efficiency of 29.15 per cent. The remaining seventy-nine stations, of which fifty-one are composite in character, generated 105,000,000 kw.-hr. from waste heat, destructor refuse, gas and water power.

65,000-Kva. Generator Design

Respects in Which Plan Followed in Germany Differs from that Adopted in America—Constant Stresses and Self-Ventilation Are Main Features—Coil, Teeth and Rotor Designs Are Unusual

By DR. ROBERT POHL
Chief Electrical Engineer A.E.G. Turbine Works, Berlin

WHILE American engineers have all along been the pioneers in the development of large water-power plants and have done much of the work which created the modern long-distance transmission system, the German electrical industry may claim a conspicuous share of the credit which attaches to the evolution of the steam turbo-generator. The two 60,000-kva. sets at the Goldenberg works near Cologne, put into operation in 1919, perhaps give the most striking support to this claim. They are still of their kind the world's largest units in actual operation, though generators of similar output at 60 cycles are, I believe, in course of construction in the United States. The Goldenberg works generators have proved so successful, from the point of view both of economy and reliability, that an order for two further machines of slightly larger electrical capacity has recently been placed with the Allgemeine Elektricitäts-Gesellschaft, and the new units are now in course of manufacture.

Of the two alternators originally installed at the Goldenberg works only one was manufactured by the A. E. G., the other by the Siemens-Schuckert works. The design of the latter has been described by Reichel.* Its main features, especially those of its rotor, are somewhat similar to American designs. The six-pole rotor, weighing about 100 tons, consists of steel disks of 2.25 m. diameter shrunk upon a solid forging of about 1.1 m. diameter. The rotor slots are milled into the disks to receive the winding, which is laid down turn by turn, and the coil ends are held by bells of alloy steel. The total weight of the alternator is about 250 tons (4.2 kg. per kva.).

The A. E. G. alternator, though its weight and dimensions are very similar, is made after a different design, and the two other machines now in course of manufacture are improved only in details. Their output at 70 per cent power factor will be 6,600 volts, 5,250 amp., 60,000 kva., 50 cycles, 1,000 r.p.m., with a range of voltage variation between 6,000 and 7,000. At a higher power factor and 7,000 volts, each generator has a capacity of 65,000 kva. It was found that this capacity might have been obtained with a four-pole design; that is to say, with a working speed of 1,500 r.p.m., whereby a considerable economy in weight and dimensions might have been obtained. But because of the experience already gained with the six-pole design, as well as for reasons of interchangeability, it was decided to adhere to it.

The following illustrations will be of special interest to American readers, since the design differs in important respects from familiar practice, more particularly in regard to the rotor. The principle of construction adopted is to produce during the building up of the rotor and its windings stresses in all its parts so great as to exceed the stresses later on set up by centrifugal force even during the overspeed trial. There is thus no possibility of changing the balance, and the need for rebalancing on the site no longer occurs. Moreover, the mechanical factor of safety attainable with this design is so high that an overspeed test of 35 to 50 per cent above normal speed, instead of the usual 15 to 20 per cent, can be resorted to. Pursuing this principle, the rotor coils are wound completely on a winding machine, baked at a temperature of 180 deg. C. and pressed to exact shape at about three times the running pressure. They are then hard and almost like solid copper. Such coils cannot, of course, be placed

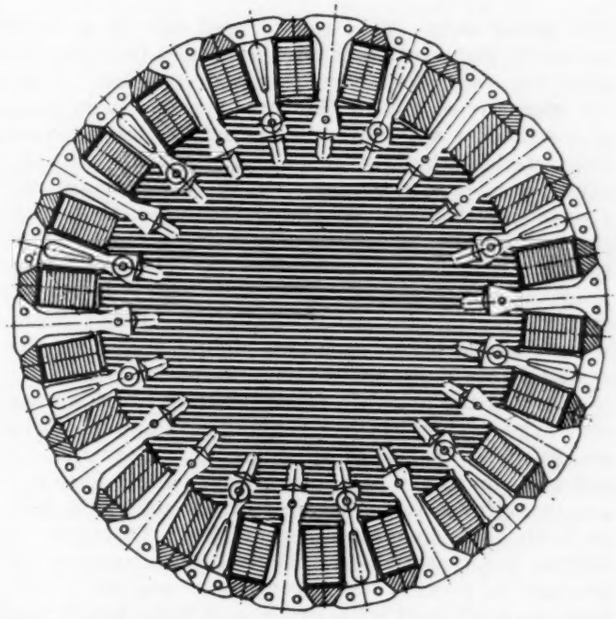


FIG. 1—ROTOR TEETH ARE DOVETAILED INTO THE ROTOR AFTER THE COILS ARE PLACED IN POSITION

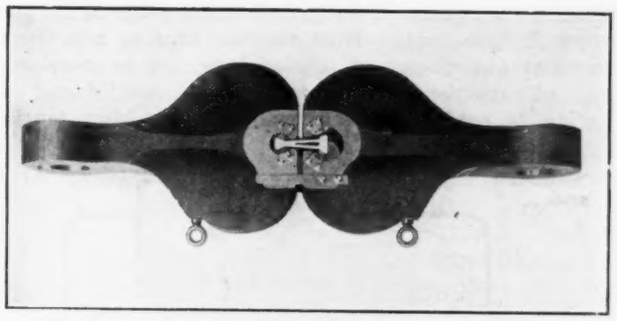


FIG. 2—TESTING ARRANGEMENT TO FIND THE MECHANICAL RELIABILITY OF TOOTH PACKETS

*Zeitschrift des Vereines Deutscher Ingenieure, Aug. 27, 1921.

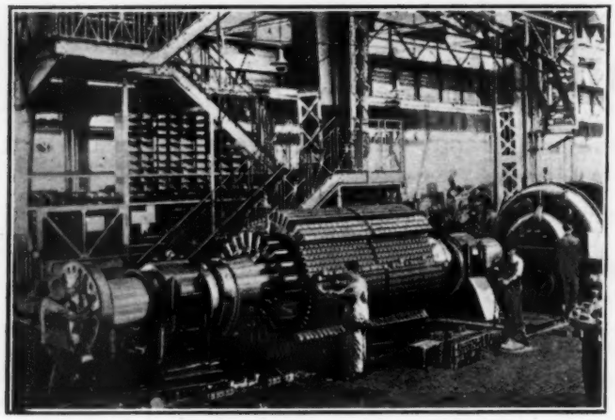


FIG. 3—NEW TYPE OF ROTOR WITH SHRUNKEN STEEL DISKS CONTAINING DOVETAILS FOR TEETH

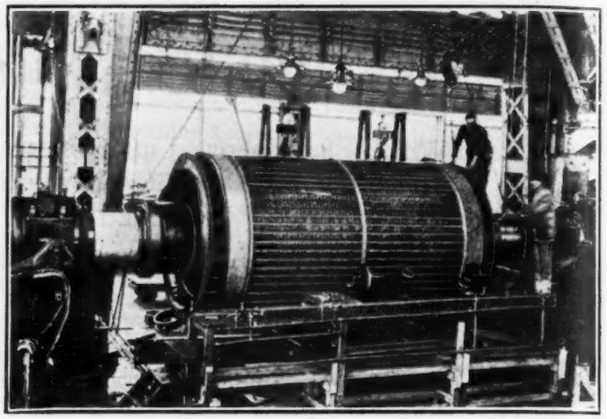


FIG. 4—STEEL-BAND WIRES ARE USED ON THE COIL ENDS INSTEAD OF END BELLS

into milled slots. They can be used only in a design in which the rotor teeth are dovetailed into the core after the coils have been placed in position. Hence the magnetic section of the rotor consists in principle of a solid core with dovetails around its circumference, into which packets of tooth punchings are threaded after assembly of the rotor coils. The packets are each riveted together and separated from one another by the projecting rivet heads. The vent ducts so created, together with the air grooves in the core and the air spaces alongside the coils in the slots, form an elaborate system of axial and radial ventilation. Heavy bronze wedges at the top of each slot, sliding upon a slightly wedge-shaped liner, finally secure all parts.

Applying the principle of construction which aims at constant stresses, whether running or standing, to the design of the rotor end windings, it is clear that the coil ends must not be allowed, under the influence of the centrifugal force, to lie against solid end bells, as is the case in most other designs. To create the desired constant stresses, the coil ends must on the contrary be pressed down upon a solid support by suitably designed steel wire bands, and these bands must be wound on under such a predetermined and recorded tension as to insure the desired result. If this is done, there is then no danger of rupture due to fatigue since fatigue results from varying tension and there is never any change of tension here, nor is there any risk of explosion. Moreover, the mechanical factor of safety is extremely high owing to the high tensile strength of binding wire. To make doubly sure, there is finally the searching overspeed trial of the complete rotor, which is extended over half an hour at 50 per cent above normal speed, and this speed must not cause any appreciable change of balance. The rotors of the new 65,000-kva. alternators differ in design from the foregoing description only because the core consists not of one solid forging as depicted, but, for obvious reasons, had to be divided into an inner solid forging and a number of steel disks shrunk upon the former. The steel disks are dovetailed around their circumference to receive the teeth. The photograph (Fig. 3) shows the state of the rotor in which the teeth are being provisionally mounted in position. Fans at either end supply the whole of the cooling air required. Self-ventilation, despite its somewhat lower efficiency, has in practice proved preferable to a separate slow-speed fan such as was used for one of the first two 60,000-kva. generators at the Goldenberg works.

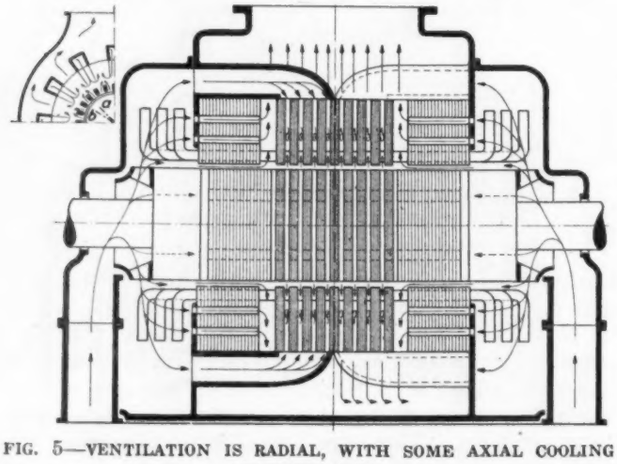


FIG. 5—VENTILATION IS RADIAL, WITH SOME AXIAL COOLING AT EITHER SIDE

The stator design, as far as the system of ventilation is concerned, corresponds to the usual plan of numerous radial ducts supplied with cooling air both from the inner periphery—i.e., from the rotor—and from the outer periphery. Axial channels are provided in the stator frame above the stampings which lead the cooling air to the radial ducts and thus insure practically uniform cooling over the whole length of the active material. Fig. 5 indicates the principle of ventilation in combination with purely axial cooling for a certain depth at either side. Local temperature measurements have shown that by suitably apportioning the amount of air to the center and the sides and distributing the ducts over the center portion hot spots are completely avoided. Thus the mean temperature of the stator winding as ascertained by the resistance method gives higher values than can be found by embedded thermocouples. In this connection it must be pointed out, however, that the stator winding, in accordance with European practice, is of the single-bar type, not of the double-bar or double-layer type customary in America. That is to say, there is only one laminated bar per slot. Hence the thermocouple can be placed only at the side of the bar, not between two bars. The end connections are of involute shape and braced in such a manner that reactors for limiting the initial short-circuit current may be dispensed with. The value of the latter does not exceed fifteen times the normal current, while the steady short-circuit current is only one and seven-tenths times the normal.

The Girl at the Window

Being a Philosophical Discussion of the Importance and the Influence of the Front Office, the Front Window and the Young Woman Who Sits Behind It

By WARREN R. VOORHIS
Vice-President American Water Works & Electric Company, New York

I HAVE great respect for chief engineers of local plants. They are at ease in the presence of vast, fearsome machines; they can read blueprints and make curves that will prove anything to one who does not understand their curves.

I am abashed in the presence of the financial directors of public utilities. Mostly they sit behind desks with glass tops. It is believed that they ponder over financial matters, and it is known that they figure with a slide rule and read New York financial journals which are not illustrated.

And who can doubt the value and influence of the general manager? The chief engineer keeps the physical plant in trim; the financial man provides the money, and the general manager co-ordinates these, and the result is a unit of service to the city.

Sometimes the general manager is even called tc the home office for a conference, and if this does not indicate his importance, I don't know what proof anybody would require.

The engineer, the financier and the manager—useful men these, and responsible.

THE COST OF THE FRONT WINDOW

Now let us start this article—"The Girl at the Window."

For every patron who knows the engineer of the plant a hundred patrons know the Girl at the Window. Ninety-five per cent of the consumers will live in comfort and die in peace without ever being inside the plant, but 95 per cent of them know the front office and persons in charge there.

If you mention the light plant to a consumer, he will not think of the engineer, certainly not of the financial director or even the manager. He thinks of the front office.

Here is a matter for some thought.

When the price of coal goes up the engineer can measure the increased cost of operation accurately. When money is dear the financier can calculate its effect upon the company's operations.

I do not know how to measure exactly that reduced efficiency of a plant which can be caused by a mean disposition and a snippy tongue at the front window, but it must be considerable.

FRONT OFFICE APPEARANCE

The Girl at the Window will give the manager no peace until she gets a neat, clean front office.

Maybe not blue-veined marble and white tile and shining plate glass—soap and water and paint will help.

No wallpaper can stand constant exposure for more than ten years without giving way under the strain. If the county fair is over in July, the poster in the front office might as well come down shortly before Christmas. Some one ought to keep the wall calendar in the front office torn off to within ten days to two weeks of the true date.

In the public utility business there are two articles which never seem to wear out, cast-iron pipe and the blue window shades in the front office; but the pipe is buried in the ground, while the shades can be seen of all men.

Once or twice in a decade they should be turned bottom end to the top.

If there is a wall desk in the front office where people may write checks, the public pen should be changed annually.

It must be remembered that a patron writes such checks with great groaning of spirit at best, and if he is obliged to struggle with pasty ink and a rusty pen, by the time he gets to the front window he is far on the road to Bolshevism, and the most charming and courteous of girls will have a hard time to keep the peace with him.

There is a little front office down in Virginia which is a pleasure to remember. So clean, so bright and businesslike and wholesome, it was a fine setting for the very competent and charming young lady who, in Virginia, one would, of course, expect to meet.

If the company expects the Girl at the Window to help create and keep the good will of the patrons, don't handicap her by a front office which has the general color scheme of a waiting room of a flag station on a branch railroad line which is in the hands of a receiver.

FRONT-WINDOW CONVERSATION

Ths Girl at the Window always remembers she is dealing with people at a time when they are engaged in the distasteful business of paying for a necessity.

A man who appeals to high heaven for relief against the extortion of a soulless corporation when he pays a three-dollar gas bill will stand in line for hours to pay ten dollars for a ticket to a prize fight.

This is perfectly right and proper and as it should be, and in the perfect state all necessities will be free and we can spend our money for luxuries.

I only call attention to the fine opportunity this gives to the Girl at the Window to improve her disposition.

Anyobdy can get along with people when they are happy and cheerful and good-humored.

But in her dealing with scores of people of every degree, every day, when they are not especially gay or in a festive mood, she has an opportunity to develop that charm of pleasant, courteous personality for which there is room in every home or business on this earth.

But if the Girl at the Window wishes to cultivate a sarcastic style of conversation, she will never have a better opportunity. Brilliant repartee, it is called in collegiate circles; bright, snappy stuff, at the ten-cent stores. It sounds funny in magazine stories, and people laugh at it on the stage.

She can ask a customer what he expects the company to give him for three dollars, anyway. She can tell him that she should worry whether he pays his bill or not.

She can tell the world that she is not there to hear all the grief in town, but only to take in money. She can ask the man who doesn't like the way we run our company what he is going to do about it. Bright, snappy stuff, as we have said, and clever and original.

And so safe—for all the time she is behind her window and people can only pay and damn the company.

Or she can be a little more like that Girl at the Window down at Evansville. The other day the manager told me that she knew hundreds of patrons by name. He said she managed to slip in a friendly word with every receipt.

He told me that this girl had friends everywhere—from bank presidents to laborers.

This girl probably has a way with her. No doubt she is really interested in people and from her window looks out on a friendly world. I have noticed that friendly, happy people generally live in that kind of a world.

I gathered from my talk with the manager that the company intended to keep her as long as she would stay. I should think so.

WHAT THE GIRL SHOULD BE

The Girl at the Window is a business girl, and she knows it and looks it.

But, man of courage that I am, I can perhaps bring myself to a description of how she looks, but not how she achieves it.

If I were an old-fashioned person, this would be the place in this article for me to deplore the alleged fripperies, frivolities and transparencies of our girls.

But I am not an old-fashioned person. Anything but. And while my eyes are perhaps not so good as once they were, they have taken no injury from looking at the American girl.

But, just as I feared, I find I can only describe the impression she makes, not how she does it. She is that combination of trim, well-set-up and intelligent competence, plus a friendly, courteous charm of manner, which makes the modern American girl an important factor in business.

I have heard that there are two schools of thought among business girls as to the amount of information about the business which they should have.

One theory is that a girl needs to know only the one thing which she is employed to do and the boss has no business to expect her to know any more. I have heard that this is the view of many employees.

The other theory is that she should learn all she can of all sides of the business. I am told that this theory is held by many employers formerly employees.

The Girl at the Front Window is not perplexed by this rivalry of thought, for she is obliged to know all about all the business, or where the information can be had, in order to run her particular job.

One time, down in Alabama, I stood for a while by the front window, near enough to hear the talk.

It took far more knowledge of the plant than I had to answer the questions, but each patron got an answer of some kind. He either got the information he wanted or was told where to get it.

And she did not seem to take these questions and requests for information as a personal affront.

She actually gave me the impression that, in her opinion, people were entitled to courteous consideration along with the privilege of paying their bills.

A good many people appreciate that kind of treatment.

The Girl at the Window will find that a general knowledge of the business will be no serious impediment to her success.

The chief engineer is a harried man who lives in fear of increased operating expenses. He works for increased efficiency at lowest cost.

Here the Girl at the Window has a distinct advantage, for she can reduce friction between the company and the consumers without spending a dollar more for oil.

She knows that it does not take any more coal to pump water or supply electrical energy to a satisfied consumer than to one who is mad.

In the whole operation there is no place where efficiency can be increased at less money cost than in the front office.

A WORD OF ADMIRATION

If I were writing this article to young men I would close with a few appropriate and well-chosen words of wisdom and advice.

But it is for the Girl at the Window, and no man living or dead ever added anything to his reputation for wisdom by giving admonition or advice to women.

If any girl reads this, she will take of it so much as she approves, first and properly remarking that no man who never stood one day behind a front window has any right to tell her about her business.

But if the Girl at the Window will have none of my advice, perhaps her repugnance to a word of admiration and appreciation is not invincible.

That is the purpose of this writing.

New Hydro-Electric Plant on the Rhone

THE hydro-electric plant under construction on the Rhone, 20 km. below Geneva, reports the *Alpes Industrielles*, will be equipped to furnish a maximum of 40,000 hp. from a flow of 450 cu.m. per second, available during a part of the year only. The work is now under way simultaneously in France and in Switzerland as the frontier at the site of the dam follows the middle of the river. In the construction provision is made for the future necessities of navigation.

The height of the fall will be about 9 m. at low water. At high water it will be appreciably less because the upper levels must remain invariable because of administrative requirements, while the lower levels will be considerably raised. The equipment of the plant will consist of five turbines capable of developing 8,700 hp. each, functioning at a speed of 83.3 revolutions per minute. Each turbine will take 92 cu.m. of water per second, a figure which, it is claimed, constitutes a record in Europe. Above each turbine will be installed an alternator, operating at the same speed and transforming the energy into a three-phase electric current of 11,000 volts. A transformer station will change the current to 120,000 volts for greater facility of transport to places of utilization.

It is expected that this plant, which is intended primarily to furnish power for industrial needs in the Departments of the Ain and Saône-et-Loire, will be put into operation toward the end of 1924.

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

Why Not Reset Used Poles?

To the Editors of the ELECTRICAL WORLD:

In the operation of a large traction and electric service system replacements and rehabilitation of lines require a continual changeover of poles and during the course of several years the pole yard grows to cover a considerable area. Unless some means is devised to put these poles back on an earning basis for the company much money is lost or thrown away if the poles are "stubbed" or used indiscriminately.

However, the Traction Light & Power Company, Anderson Ind., has a system which eliminates this waste. As each group of old poles is brought into the yard they are sawed off at the ground line, if this section is badly rotted. At any rate they are all looked over and graded. Each pole is placed in a neat pile corresponding to its size, so that an accurate check can be made at all times of the various stocks of poles.

Then as construction orders come through for extensions to rural lines, or short runs in alleys, where old poles in good condition can serve just as well, the required number of poles are taken from this pile. Of course, a close check must be kept as to the actual physical condition of the poles, since there is an economic limit beyond which it would be unprofitable to use them again. However, our company estimates that if such a shortened pole will last five years on an alley or a short rural extension line that pole has more than paid for the cost of setting.

The entire question is an economic one, determining whether the remaining life of a used pole will outbalance the cost of its setting. Some thought must also be given to the waste of stubbing poles and putting them to better advantage. There is no need of cutting up a 25-ft. pole which has about ten more years of life when smaller poles will serve equally well!

J. W. WALKER,
Operating Superintendent.

Anderson, Ind.

Protective Value of Weatherproof Wire

To the Editors of the ELECTRICAL WORLD:

A large number of engineers and operating men are guilty of the error of thinking that weatherproof wire does not afford any protection after a few years' use. I am ready to admit that this is true of some classes of weatherproof insulation, but a thorough canvass among line foremen and linemen who have worked for a number of years on heavy distribution leads in cities will convince the most skeptical that weatherproof insulation affords some real protection.

I undertook the investigation of this subject prejudiced against weatherproof insulation, and finished fully convinced that there are many places where it should be used. If it is to be used at all, the best insulation procurable should be used. In some of the correspondence I had on this subject one superintendent wrote that the only reason he used it was to comply with city ordinances, and he wanted the very cheapest weatherproofing that he could get.

My investigation showed conclusively that a large amount of first-class weatherproof insulation is damaged, when being strung, by pulling it over sharp-edged cross-arms. Linemen have told me that they have seen two braids of brand new wire cut through by this careless method of handling, and they have also admitted that a little ordinary care would have prevented it. Wire damaged in this manner and exposed to the weather for periods of one to three years becomes taggy and stringy, and of course gives no protection, and has created the impression that all weatherproofing is a farce and a fraud. I have seen cases where weatherproof insulation was hanging from the wires, caused by the wires being temporarily overloaded to such an extent that practically all the compound was melted out. On one occasion I saw a weatherproofed railway feeder so heavily overloaded for a short period that the insulation caught fire and was completely ruined for a distance of nearly a mile. It is occurrences of this kind, without all the facts being known, that have hidden the truth as to the protection afforded by first-class weatherproofing carefully installed.

S. C. LINDSAY,
Electrical Engineer.

Puget Sound Power & Light Company,
Seattle, Wash.

Arc-Type Better than Induction Furnaces

To the Editors of the ELECTRICAL WORLD:

According to the article in your July 28 issue entitled "Electric Furnaces Exclusively Employed in Germany," it seems that induction furnaces are generally used, but I believe that the modern arc-type furnace with electric motor control for the electrodes controlled through current and voltage is a far more successful and more accurate furnace than the induction type, which, as far as I know, is becoming a past issue in the United States in the steel industry on account of the poor operating conditions and especially on account of the power-factor conditions.

One point of the article that did not appeal very much to me was the type of control of the electrodes. I do not see how hydraulic-type control can in any way compare with the type used in modern furnaces built in this country.

GEORGE W. QUENTIN,
Power Sales Engineer.

Duquesne Light Company,
Pittsburgh, Pa.

Limitations of Utility Regulation by Cities

To the Editors of the ELECTRICAL WORLD:

In the news report of my remarks in the July 14 issue you gave an incorrect version of my comment.

I did not say that the regulatory system in Iowa had proved superior to that employed in many states where elaborate commissions have been created. I did say that in cities of sufficient size to warrant the expenditure of the funds necessary to procure expert advice and assistance the practice had been satisfactory, where an honest effort had been made by city councils to fix just rates. I further stated that as to all other cities and towns—that is, those where they were without sufficient funds to employ the necessary advice and assistance—the Iowa system was a failure and, in my opinion, could never be made to give satisfactory results. I also gave a fairly general outline of the difficulties attendant upon the making of rates for companies serving many communities over long-distance transmission lines.

W. CHAMBERLAIN,
Vice-President and General Counsel.

United Light & Railways Company,
Cedar Rapids, Iowa.

Central Station and Industrial Practice

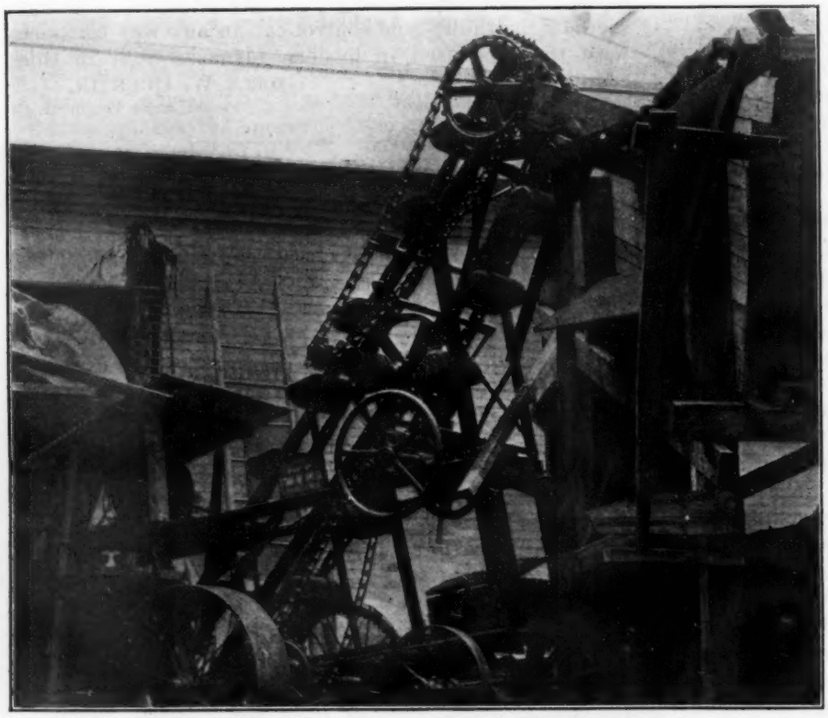
Installation, Operation, Maintenance, Test and Repair of Generation and Distribution Equipment, and Methods of Economically Utilizing Electric Service in Large Industrial Plants

Motor-Driven Loader Saves Double Its Operating and Rental Cost

A SAVING of at least five men's labor was made recently in moving 1,200 tons of anthracite coal at the Massachusetts State House, Boston, by the use of a 5-hp. motor-driven loader. The outfit was rented from the Conant Machine Company, Concord Junction, Mass., and the total cost of its operation, including rental and electrical service, was about $170 for the twenty days required to transfer the fuel.

The boiler plant recently was changed over for fuel-oil combustion and the stored coal was turned over to the city of Boston for schoolhouses. The coal was stored in bins in the basement of the State House, and after being shoveled into push-cars and run upon an elevator to the boiler-room floor, it was pushed into a courtyard on a portable track and dumped at the foot of the loader. This raised the coal 12 ft. and deposited it in bins built of boards for the work, from which it fell into 5-ton trucks. About ten men were employed in shoveling into push-cars and taking these to the courtyard, two men attending to the loading. Had the loading been done by hand, about seven men would have been required for the work. The saving effected was about $350, and the maximum day's loading for the entire period was 115 tons.

FIELD EDITOR ELECTRICAL WORLD.
Boston, Mass.



ELECTRIC COAL LOADER SAVED $350 IN TWENTY DAYS

High-Voltage Distribution Costs

Diagrams Show for Certain Specific Conditions of Load and Transmission Distances the Relative Economy Obtained by Using Higher Voltages

AN ECONOMIC study of higher voltage distribution is one of the interesting features that were included in the overhead-systems committee report presented at the recent N. E. L. A. convention in New York. For the purpose of study the distribution system is divided into two essential parts — lines and transformer installations. This particular part of the report was compiled by the sub-committee on higher voltage distribution lines, E. C. Stone, chairman.

In general the cost per kva. of lines decreases as voltage goes up, but that of the transformer installation increases with the higher voltages. For scattered connections on large-capacity installations the cost of the line predominates, so that higher voltages give lower total costs. On the other hand, for many connections close together and relatively small the cost of transformers predominates, making the lower voltages more economical.

In the case of long feeders to load centers around which many small customers are grouped it may be better to use higher voltage for the feeder with step-down transformers to 2,300-volt or 4,000-volt distribution at the feeding point.

It is, of course, the annual cost year in and year out which is of interest. The correct answer therefore involves a knowledge of cost of line and transformer losses under the various conditions and the operating cost of the various types of installations used.

In diagrams presented herewith an attempt has been made to show for certain specific conditions of load and transmission distances the relative economy obtained by using higher voltages. In compiling the curves the following assumptions as to fundamental conditions were made: Annual cost of investment in lines and transformer installations, 15 per cent of first cost; cost of energy delivered to distribution circuit at substation, $0.01 per kilowatt-hour; copper loss in lines and transformers, assumed equal to

those resulting from operation at full load four hours per day.

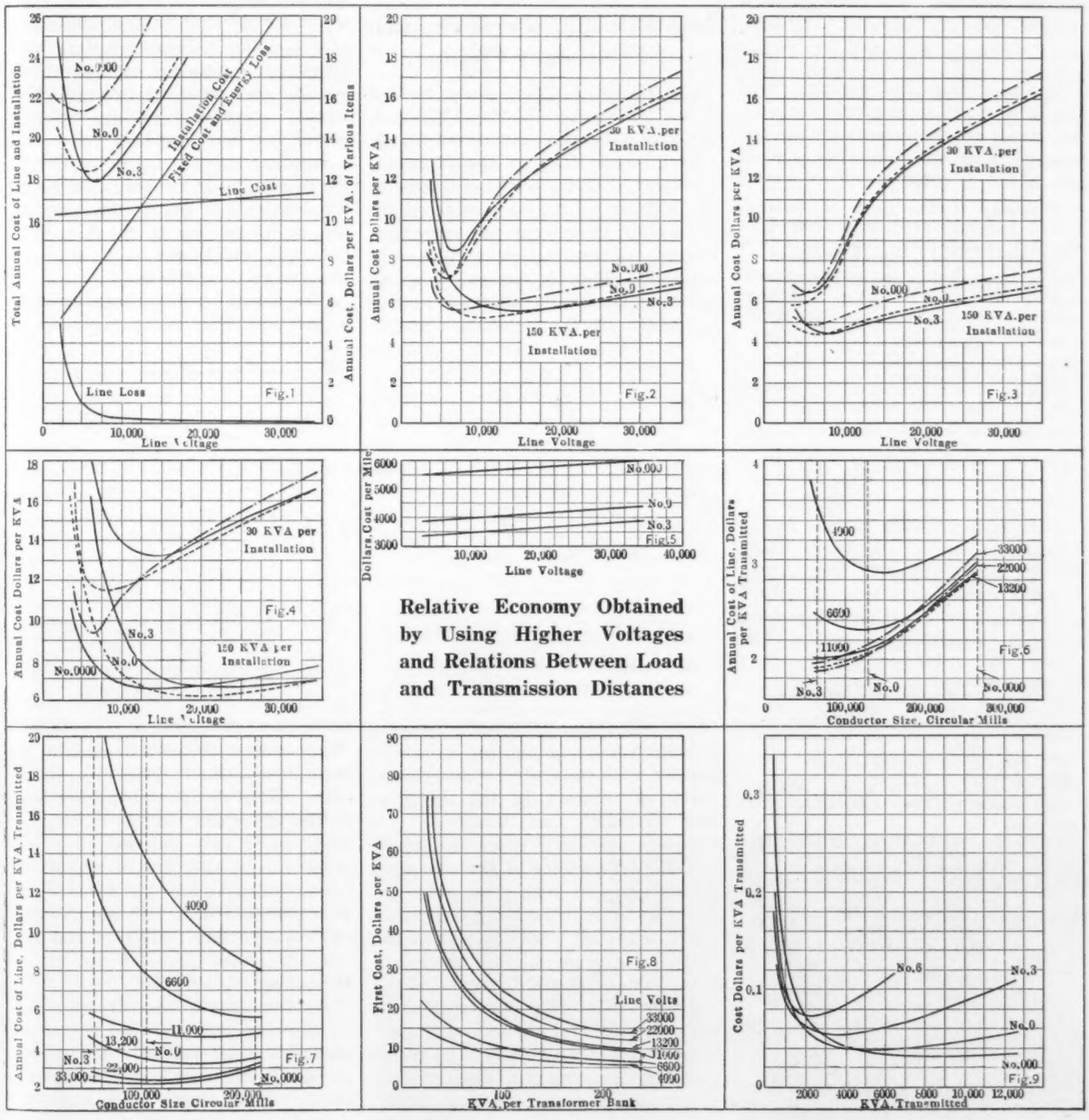
All load is considered as centered at the end of the line. If load is assumed to be uniformly distributed over the entire length of line, the copper losses will be one-third of those computed on the basis of load at the end of the line; or, if the cost of the copper loss is kept constant, full load with the load uniformly distributed can be maintained for twelve hours, or three times the period allowed with the load concentrated at the end of the line.

The curves prove very clearly the principles outlined above, thus:

For a load of 1,500 kva., consisting of 300-5 kva., single-phase installations, with 5-mile transmission distance, the most economical voltage is 6,600. (Fig. 1.)

For the same total load and the same transmission distance, made up of fifty installations of 30 kva. installed capacity each, the most economical voltage is around 6,600, and for ten installations of 150 kva. the most economical voltage is around 11,000. (Fig. 2.)

For 750 kva. load, 2½-mile transmission distance, and a corresponding number of the same size of transformer installations, the most economical voltages are lower—4,000 to 6,600—as is to be expected (Fig.



Figs. 1 to 4—Annual cost per kilovolt-ampere of line and installations. Fig. 1—1,500-kva. load of 300-5-kva. single-phase installations; 5 miles distance. Fig. 2—1,500-kva. load of 30-kva. and 150-kva. installations; 5 miles distance. Fig. 3—750-kva. load of 30 kva. and 150 kva. installations; 2½ miles distance. Fig. 4—3,000 kva. load of 30-kva. and 150-kva. installations; 10 miles distance.

Fig. 5—Line cost for single circuit line for various wire sizes, line spacing 125 ft.

Fig. 6—Annual cost of line per kilovolt-ampere transmitted versus conductor size for different voltages; 750-kva. load at 2½ miles distance.

Fig. 7—Annual cost of line per kilovolt-ampere versus conductor size for different voltages; 3,000-kva. load at 10 miles distance.

Fig. 8—Customer installation costs, three phase, including transformers. Lightning arresters, fuses, etc., mounted. Fixed changes at 15 per cent and energy at $0.01 per kw.hr.

Fig. 9—Annual cost per kilovolt-ampere per 1,000 ft. of transmission line 22,000 volts, 10 equivalent hours. The most economical loads for Nos. 6, 3, 0 and 3/0 wires are 2,000, 3,500, 5,000 and 8,500 kva. respectively.

3); and for a total load of 3,000 kva., with a transmission distance of 10 miles and with a corresponding number of the same size of transformer installations, the equivalent voltages approximate 6,600 and 22,000 respectively. (Fig. 4.)

For the best economy it is, of course, necessary to treat each case on its own merits, as the possible combinations of costs, distance, size of installation, etc., are always infinite.

TYPICAL CALCULATION

In order that the methods used herewith may be employed in specific cases for determination of the best voltages the following typical calculation is given:

Necessary Data.—Cost of energy, 1 cent per kilowatt-hour delivered to circuit in substation. Load to consist of fifty three-phase installations of 30 kva. each, located at end of line; transmission distance 10 miles. Annual cost, including interest, depreciation, maintenance and operation of line transformer, installations, 15 per cent of first cost. Assumed load is equivalent to four hours at maximum demand each day.

A complete sample calculation is given here for a 30-kva., 22,000-volt installation.

Figs. 5 to 9 give sample cost curves such as should be prepared for a study of this type.

FIELD EDITOR ELECTRICAL WORLD.
New York, N. Y.

COST OF 30-KVA., 22,000-VOLT INSTALLATION

Transformer Installation Cost:	
Concrete platform	$600.00
Pole structure—two poles	20.00
Labor	20.00
Transformers — three single-phase	735.00
Labor	176.00
Fuses S. & C. 25,000-volt, 50-amp.:	
Fuses $31.50	
Mountings 63.00	
Clips 6.00	
	100.50
Labor	20.00
Lightning arresters, three Westinghouse type LE	193.00
Labor	30.00
Total	$1,894.50
Per kva.	$63.15

Annual cost, at 15 per cent = 0.15 × $63.15 = $9.47

Transformer Losses:

Iron loss, 220 watts per transformer:
220/1,000 × 8,760 = 1,920 kw.-hr. per transformer.

Copper loss, 210 watts per transformer:
220/1,000 × 4 × 365 = 306 kw.-hr. per transformer.

Total loss:
⇒ 3 (1,920 + 306) × $0.01 = $66.78
Cost per kva. = $2.23.

Line Cost:

Computed equal to $4,150 per mile for No. 1/0 wire.
0.15 × 4,150 = $622.00.
$622/1,500 = $0.415 annual fixed cost per kva. per mile.

Line Energy Loss Cost:

0.785 amp. current due to one customer
30,000/(√3 × 22,000) = (30 kva.).

$$\frac{3 I^2 R_l \times 365 \times 4 \times 0.01}{1,000} =$$

$0.01494 annual cost per mile of energy due to *only one* customer on line.

If there are fifty customers on the line, the current is fifty times as large, and the I^2R loss is 2,500 times as great; however, the total loss is to be divided between fifty customers, so the loss chargeable to each customer becomes 2,500/50 = 50 times the loss due to the current drawn by only one customer. As a general rule, we may say the total loss chargeable to any one customer (all assumed to be same size) is equal to the number of customers times the loss caused by current drawn by one customer.

50 × $0.01494 = $0.747 total loss.
$0.747/30 = $0.0249 cost of line loss per kva. per mile.

Input-Output Performance of Frequency Changer

AN OVER-ALL efficiency test of a 25-cycle, 33,000/2,200-volt, 900-kva. substation connected to the transmission lines of the Niagara, Lockport, & Ontario Power Company is outlined below, as conducted by the writer. In order to use purchased energy in conjunction with locally generated 60-cycle energy, the distribution company operates from the secondary of the substation a 25-cycle-to-60-cycle, 2,300-volt, 500-kva. induction motor-generator to run in parallel with water-driver and steam-driven generators in the distribution company's main station.

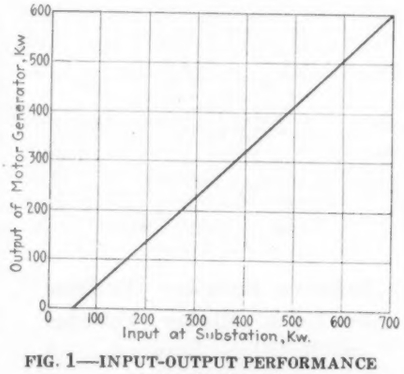


FIG. 1—INPUT-OUTPUT PERFORMANCE OF SUBSTATION

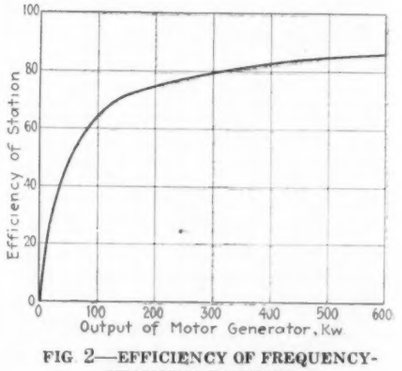


FIG. 2—EFFICIENCY OF FREQUENCY-CHANGING EQUIPMENT

It was desired to check the input-output performance of the combined substation and motor-generator to allow a curve to be drawn showing input at the high-tension side of the transformers as the abscissa and output to the station busbars as the ordinate (Fig. 1). The motor-generator field excitation was not measured or taken into account as the only information desired was substation input and machine output.

It was decided to take the data from the power company's watt-hour meter in the substation to measure the input and from the distribution company's switchboard watt-hour meter, which measured the output of the motor-generator.

The data were taken while the motor-generator was running in parallel with the waterwheel generators so that load could be shifted to or from them to obtain the different points on the curve. The method of obtaining the readings was to time the input and output watt-hour meters simultaneously with stop watches, while the operator manipulated the waterwheel governor to throw all load fluctuations on the waterwheel generator, thereby keeping a steady load on the motor-generator. The watt-hour meters were timed for a number of revolutions, so that each reading covered about twenty seconds, giving average power for that length of time.

Readings were taken with the motor-generator running idle to get the zero output point and every 50-kw. or 75-kw. up to the last point obtained, which was an output of a little more than 600-kw.

The result obtained was virtually a straight line from zero output point to the maximum. There is a slight curve downward due to the heat losses which is hardly noticeable. This deviation appears only in the upper part of the curve. The curve as drawn includes all points taken except two, one of which was below the curve and the other above. The amount these two points were off was less than 1 per cent and data taken to check them fell directly on the curve.

Another curve was drawn (Fig. 2) showing input divided by output plotted against output. This is not an actual efficiency curve of the apparatus because excitation is not included, but shows what percentage of input was converted into kilowatts delivered to the busbars of the main station.

WALTER A. CHURCHILL,
Electrical Engineer.
Eastern Massachusetts Electric Company,
Boston, Mass.

Relation of Circuit Breakers to Interconnection

RECENT advances in interconnection have led to an extremely rapid development in oil circuit breakers for heavy duty. Units are now under construction to rupture 1,500,000 kva. at the arc in both high- and low-voltage types, stated H. H. Dewey of the General Electric Company at a recent meeting of the New England System Operators' Club at Schenectady. The analysis of maximum rupturing capacities likely to be needed at different points on an interconnected system is becoming of increasing importance. Mr. Dewey stated that recent studies of New England interconnections showed a total generating capacity of nearly 1,000,000 kva. tied together. If this were all concentrated in one station a short circuit would amount to from 2,000,000 to 2,500,000 kva., but that the natural reactance of the connections limit short circuits in most places to less than 1,000,000 kva. In studies of this kind the short-circuit current rating generally exceeds the generator rating, but reactance saves the day. Too much reactance, however, has a tendency to segregate a system and to throw synchronous apparatus out of step.

The high cost of heavy-duty circuit breakers, some 220,000-volt units, representing an investment of $35,000 each, is due in part to the fact that the industry and interconnection are growing too fast to allow standardization. Designing engineers are studying test data with more thoroughness than ever before. At Schenectady a 27,600-kva. turbo-generator is available for short-circuit tests. The use of the explosion chamber in oil circuit breakers of new design has been so successful in increasing rupturing capacity that the same principle can be applied to many breakers in service to increase their rating without requiring changes in the dimensions of switch cells. This eliminates oil throw, and in the case of the "H-3" type breaker increases the rupturing capacity about 40 per cent, the gain with the "H-6" being 10 per cent and with the "H-9" 30 per cent.

The high cost of modern transmission lines renders it important to operate them at a high load factor. A typical 220,000-volt line costs from $15,000 to $20,000* per mile per circuit, and on a transmission of 150 to 200 miles the total line cost is comparable to the plant investment. This economic situation warrants careful study of circuit-breaker selection, and while operating companies cannot afford to "run wild" over protection, the cost of interruptions must be carefully weighed. Unless a high-voltage arc across a string of insulators is broken with great speed, it may easily involve a steel tower and cause a protracted shutdown. The inherent reactance of water-power generators may be 25 to 30 per cent, compared with 12 to 15 per cent in steam turbo-units, which makes circuit-breaker selection somewhat easier for hydro-electric systems. Under 15,000 to 20,000 amp. the magnetic forces exerted in breakers are not very serious, but in installations it is important to draw up all nuts to prevent loosening on short circuits. In the present switchboard types of breaker a maximum pressure of 60 to 75 lb. per square inch may occur on rupture, and in the type H breakers this may rise to 150 to 200 lb. The explosion chamber permits the breaker to handle a greatly increased current capacity without increase of pressure.

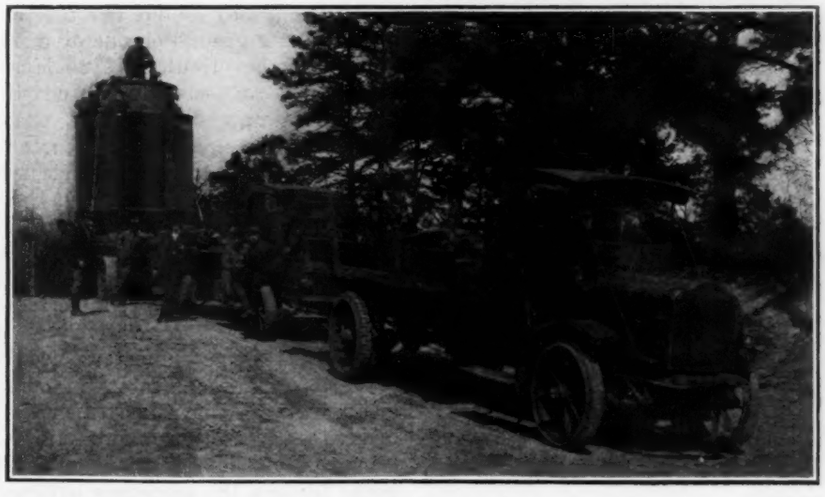
FIELD EDITOR ELECTRICAL WORLD.
New York, N. Y.

[*Costs solicited from various sources would indicate that double-circuit 220,000-volt 100,000-kw. transmission lines would cost $25,000 to $65,000 per mile, depending on conditions.—EDS.]

Tractor Moves Heavy Transformers

TRANSPORTING heavy distribution transformers over rough country roads often becomes a problem of considerable magnitude—especially so when the apparatus is filled with oil. To make sure of an absolute means for moving heavy equipment and also to insure continuity of service, the Georgia Railway and Power Company recently built the tractor shown in the accompanying illustration. It was designed by the writer and built in the company's shop of steel I beams to carry a weight up to 35 tons. Ordinarily two 5-ton winch trucks are used for hauling. They furnish enough power to negotiate the hills of the surrounding country. The transformer illustrated is rated at 2,000 kva. at 110,000/38,000 volts. It had a shipping weight of 26.4 tons, and the construction crew of eight men under T. M. Fellers moved it one mile from the railroad.

A. L. SMITH,
Superintendent Tests and Repairs,
Georgia Railway & Power Company,
Atlanta, Ga.



CONSTRUCTION CREW MOVING A 26.4-TON TRANSFORMER ON COMPANY-BUILT TRACTOR

Three-Phase Distribution Transformers Favored

THREE-PHASE versus single-phase distribution transformers, 4,000-volt distribution, radio communication and automatic generating plants were the chief features of the recent meeting of the technical committees of the Pacific Coast Electrical Association.

Many of the companies represented at this meeting favor three-phase distribution transformers and are using them extensively, while others feel that under their peculiar operating conditions the single-phase unit is the most flexible and economical. The principal objection to the three-phase unit seems to be its lack of flexibility for handling combination power, range and lighting loads. The fact that 97 per cent of the distribution transformers manufactured are of the single-phase

type is responsible for the higher cost of the three-phase unit. Until more companies adopt the three-phase transformer which will allow the manufacturers to reach quantity production this difference in price in favor of the single-phase transformer will exist.

FIELD EDITOR ELECTRICAL WORLD.
San Francisco, Cal.

Extracts from an Operating Code*

BY FIELD EDITOR ELECTRICAL WORLD
New York, N. Y.

Restoring Service After Interruptions

SERIOUS damage to apparatus, repetition of the interruption and false indication of location of trouble may result in restoration of power to the bus if defective incoming feeders or apparatus or undamaged rotating apparatus be left connected to the bus. It is essential to clear the bus and restore lines and apparatus to service either according to specific order from the load dispatcher or, where a definite program for restoring service without specific orders is in effect, according to that program. Following are detailed instructions for restoring service after an interruption in substations.

Total Interruption

1. Carefully note whether or not any switches have opened automatically and, if so, if they have spilled oil. This rule is of vital importance as a preliminary step to restoring service and the operator must check his first observations by any means that will insure an absolutely correct report to the load dispatcher.
2. Clear the high-tension buses.
3. Report to the load dispatcher. The procedure followed by the load dispatcher will depend upon the reports received from the various stations affected. If no spare apparatus is available and the line oil switch opens without any indication of damage, the load dispatcher may order it back without testing. If spare apparatus can be used or if there is evidence of damage prescribed tests must be made before the line may be put back into service, and in no case should more lines be put back than necessary to carry the load.
4. Watch the pilot lights, put on the first line which comes back, and energize the lines supplying those substations which were being supplied before the interruption.
5. Open sufficient circuits or feeders so that the load will not be excessive when service is restored.
6. (a) In alternating-current substations and direct current substations open a sufficient number of circuits or feeders so that the line on which the service is restored will not be overloaded.

(b) In Edison district substations either of the three following general methods may be employed:

First—Connect all special feeders to a separate bus fed by rotary converters or other units at normal voltage. Connect the remainder of the station load to another bus fed by motor generators or other units at low voltage. If the capacity of the machines on the low voltage bus will permit, raise the voltage to normal and parallel with the normal voltage bus. If the capacity is insufficient, raise the voltage until the machines are loaded. See that the machine capacity connected to the normal voltage bus is at least equal to the difference between the station load and the machine capacity on the low-voltage bus. Connect the low-voltage and normal-voltage buses through circuit breakers or other ties of sufficient capacity.

Second—Connect all special feeders to a separate bus fed by rotary converters or other units at normal voltage. Start, bring up to voltage and connect to a separate bus, which has been cleared, a sufficient number of generating units to carry the street load. Put all the street feeders on this bus simultaneously.

Third—Start a sufficient number of rotary converters, motor generators or generators to carry the entire station load. Adjust their voltages for proper paralleling. Connect them to direct-current bus as nearly simultaneously as possible and immediately adjust the field rheostats for proper load division.

7. Load the station.

Partial Interruption

1. If the interruption to the service is only partial, the procedure to be followed will vary, depending upon the extent of the interruption and the station at which it occurs. In general, follow the procedure outlined for a total interruption as far as may be required by the nature of the interruption. In addition, follow such special instructions as have been issued for the particular station.

If an oil switch on an outgoing feed trips it may be due to either an overload or a ground on one or more phases of the circuit. If no large motors are connected to the circuit the switch may be closed at once. Circuits carrying large motors equipped with no-voltage releases must be left open for a sufficient time to allow all the releases to operate. Observing the ammeters and the ground detectors on closing the oil switch will be a fairly reliable indication of trouble. A relatively slow movement of the ammeters needle across the scale indicates an overload, while a violent movement indicates a ground or short circuit. With circuit interruption on outgoing feeders, the procedure outlined below should be followed:

1. Close the oil switch at the end of the time given on the circuit schedule, observing the ammeters and the ground detectors, noting particularly whether or not the closing of the oil switch causes any change in the ground detector readings.
2. If the circuit trips again, try to determine which phase is defective.
3. Report to the load dispatcher.
4. If the circuit trips the second time and the ammeters do not indicate the defective phase, if ordered by the load dispatcher, open the A phase disconnecting switch and again close the circuit switch.
5. If it trips again, close the A and open the C phase disconnecting switch and again close the circuit switch to see if their phase holds.
6. Report to the load dispatcher, either that the circuit will not hold or on which phase it will hold, as the case may be.

Instructions for Shutting Down Turbo-Generators

WHEN shutting down turbo-generators proper oil pressure should be maintained on the bearings to keep the rotor floating until the unit is actually at rest, the sealing system should be regulated to prevent cold air being drawn in and injuring the heated parts and the operator should listen for rubs or unusual noises within the turbine. It is even more important to admit steam to the seals on shutting down than in starting up, as heated parts of the machine may be seriously damaged by cold air currents being drawn in when the first stage pressure falls below zero gage. Also after closing throttle the globe vacuum valve should be opened and left open so that throttle leaks cannot result in dangerous pressure and temperature conditions in the turbine and condenser.

Following are detailed instructions for shutting down a turbo-generator:

1. After receiving and answering the signal "Stand By" from the switchboard operator regulate the sealing system as the load decreases.
2. Start the auxiliary oil pump by hand to see that it will start properly.
3. After receiving and answering the signal "Stop" from the switchboard operator close the throttle slowly.
4. See that the auxiliary oil pump starts as the machine slows down and that proper pressure is maintained.
5. Shut off the steam seals (and water seals, if installed).
6. Shut down the air pumps and wet pumps.
7. After the machine stops, shut down the circulating pump.
8. Shut off the oil and water supply to the main bearings and oil cooler.
9. Shut down the auxiliary oil pump.
10. Open the vacuum globe valve after the vacuum has been reduced by leakage of air through the seals.
11. See that all admission valves have been opened by the governor.
12. Make a general inspection of the turbine.

*Abstracted from the operating code of the Philadelphia Electric Company.

Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

Electric Trucks Halve Pie Delivery Cost

Remarkable Savings Are Realized by Replacing Gasoline and Horse-Drawn Vehicles—Advantage of Greater Cleanliness—Data on Cost of Operation

By Otto J. Lange
Electric Vehicle Department, Public Service Electric Company, Newark, N. J.

BY CHANGING its gasoline and horse-drawn delivery equipment to electric trucks the Wagner Pastry Company of Newark, N. J., has effected a 50 per cent reduction in its delivery costs. As stated in the ELECTRICAL WORLD of Feb. 10, page 346, this company had placed an order for 177 1-ton Commercial Vehicle trucks equipped with sixty-cell, type 7-A Edison batteries, and advertised to sell at auction its then existing gasoline trucks and horse-drawn wagons. To date sixty-eight of the trucks have been delivered and have been in operation long enough to obtain accurate data on the economies which have been brought about.

Two years ago, when a change in the delivery system was first contemplated, the company had in operation seventy-three gas trucks and ninety horse wagons within a 30 mile radius from its Newark plant. With that equipment it cost 13 cents to deliver $1 worth of pies. The equipment as it now stands consists of sixty-eight electrics, nine gas trucks and only seven horse wagons serving the same territory, and the cost to deliver $1 worth of pies is only 6½ cents. Delivery costs have been reduced by just one-half.

As one electric will easily displace four horses further economies will be realized when the fleet is entirely electrified and enlarged to meet the requirements of increasing business. Excluding the wages of the driver, each horse costs $12 a week for feed, harness, bedding and stabling, and because of the long routes it is possible to work the horses only every other day.

Another distinct advantage that the electrics have is that both gasoline trucks and horses carry an odor that is objectionable in the pie business. In wet weather the reins get wet and make the driver's hands black, and with a gasoline truck there is always more or less dirt and grime and odor from exhaust or escaping gas. Since pies cannot be wrapped it is essential that the drivers have clean hands. As a result of using the electrics many customers have taken occasion to compliment the pastry company on the cleanliness of the drivers and the better psychological effect of the more sanitary delivery.

The Wagner Pastry Company is one of the largest bakers of pies exclusively in the East. It serves about 7,500 customers including stores, railroads, restaurants, hotels, grocers and bakers located in New York City and various New Jersey towns. The delivery routes covered by the trucks total 3,500 miles daily and most of these are completed before noon.

To serve its customers in New York the company maintains a distributing station there which is supplied by two 5-ton trucks each day from the Newark plant, a round-trip distance of 22 miles. Gasoline trucks have been used for this work but probably will be replaced with electrics, as one 5-ton electric truck is now being tried out on this service. The New York deliveries are made entirely by twenty-four 1-ton electric trucks which are maintained at a flat rate of $70 apiece per month in an electric vehicle garage near the company's distributing station. Each of these trucks average between 25 and 30 miles per day.

For the trucks making deliveries

SOME OF SIXTY-EIGHT ONE-TON TRUCKS USED IN PIE DELIVERY. THESE TRUCKS AVERAGE FORTY MILES DAILY

in New Jersey the company has installed a charging outfit in its own garage, consisting of a General Electric-Sprague motor generator set and a Cutler-Hammer switchboard with wiring outlets to seventy charging plugs. The total cost of this equipment, which is capable of charging thirteen vehicles at one time, was $5,900. Power is supplied by the Public Service Electric Company at the low rate for this service of 3 cents per kw.-hr.

Power consumption at the switchboard during the winter months averages 2,000 ky.-hr. daily, but the summer consumption drops to approximately 1,800 kw.-hr. because of better operating conditions for the trucks when the streets are clear of snow and ice. For a 1-ton vehicle during the summer the average draw is 4.5 amp. During the winter months, however, on the city routes this has been around 5 amp. and on some country routes during snowstorms it has gone up to 6.5 amp. Very little trouble has been experienced from stalled trucks during heavy weather, and deliveries have always been completed to the satisfaction of customers.

What difficulty has been had from breakdowns was not due to mechanical or inherent defects of the trucks or their design, but rather to insufficient charging of batteries or failure properly to inspect the condition of batteries and control at regular intervals. Some time after the first trucks were put in service a number were reported out of power while on a delivery route. After an investigation it came to light that batteries were not being flushed at regular intervals nor was the condition of the controllers being examined. This had resulted, first, in failure of the batteries to take a full charge, and second, controller fingers had been burned so as to make poor contacts. This experience worked somewhat as a blessing in disguise for it caused the inauguration of a rigid system of regular inspection and repair.

The average mileage of the trucks operating in New Jersey is 40 miles per day and their total monthly aver- is 58,000.

Each truck makes one trip with 90 to 100 stops per day. They leave the factory in Newark at 3 a.m., and the time of their return varies according to the length of the route, the earliest reaching the garage about 10 a.m. and the latest at noon. The procedure of taking care of the trucks in the garage is as follows: As soon as a vehicle comes in to the garage it is put on the washstand for a thorough cleaning.

Flushing of the batteries, if necessary, is the next operation, the batteries being flushed regularly twice a week. Lubricating of the vehicles occurs daily. Controllers are inspected once each week and the motors every other week.

One man is employed for this work and it is also his duty to spot

AUCTION OF DELIVERY EQUIPMENT

DON'T FORGET ON DECEMBER 15

WE WILL SELL FOR THE WAGNER PASTRY COMPANY, NEWARK, N. J., AT PUBLIC AUCTION, WITHOUT RESERVE, TO THE HIGHEST BIDDER, THEIR ENTIRE DELIVERY OUTFIT OF HORSES, WAGONS, HARNESSES AND GAS AUTOMBILES, ALL IN FIRST-CLASS CONDITION, ON ACCOUNT OF THEIR CHANGING TO ELECTRIC TRUCKS, ON FRIDAY, DECEMBER 15, 1922, AT 10 A. M., AT THE COMPANY'S STABLE, VESEY STREET NEWARK, N. J., CONSISTING OF—

57 Horses
7 Mules
32 Top Wagons
1 Concord Buggy
2 Double Trucks
14 Sets Single Harness
21 Sets Double Harness
90 Collars
1 Set New Single Harness
1 Horse Swing
1 Oat Crusher
Blankets
Stable Utensils

6 1922 1-Ton Ford Trucks with Bodies.
2 1922 1-Ton Ford Truck Chassis.
4 1922 ¼-Ton G. M. C. Truck Chassis.
3 1922 ¼-Ton G. M. C. Trucks with Bodies.
7 2-Ton Pierce-Arrow Trucks with Bodies

These Cars are all in first-class mechanical condition.

The Vogel & Schonfeld Commission Stables
H. M. VOGEL, Prop. JOHN S. WILLIAMS, Auctioneer
For Particulars Phone Market 0792

ONE OF THE RESULTS OF ELECTRIFYING DELIVERIES

the trucks in their proper places at the loading platform where the charging plugs are located and the batteries put on charge.

The regular engineers, of which there are three who work in eight-hour shifts, take care of the operating of the charging outfit in addition to their work of handling boilers, ice machines and plant maintenance. These men with three helpers, making a total of six, are sufficient to handle all of the work connected with the maintenance and charging of the trucks. They handle nearly all of the ordinary light repairs, but heavy battery work is taken care of by an outside battery concern.

Three men—two mechanics and one battery man—take care of the fleet. The two mechanics are employed to take care of the nine remaining gas trucks and also handle odd jobs around the plant. The three men for the electrics and the two gas truck mechanics with the shop foreman, a total of six, are actively engaged in the garage on the sixty-eight electrics and nine gas trucks.

Two years ago, when the company was operating seventy-three gas trucks, there were seventeen mechanics and the foreman employed solely for their repairs. In other words, each mechanic handled only four or five vehicles.

INVESTMENT, FIXED AND OPERATING EXPENSES OF ONE-TON TRUCK

INVESTMENT	
Chassis price	$2,309.13
Battery price	1,595.00
Body	600.00
Freight	30.00
Tax	117.12
Total	$4,651.25
FIXED EXPENSE	
Interest, after ten-year depreciation, 6 per cent	$153.48
License	35.00
Garage, rent, light, heat, power	85.71
Insurance	175.00
Total	$449.20
OPERATING EXPENSE	
Maintenance and repair	$164.80
Tire cost	154.30
Charging cost	183.00
Battery renewal and repair	191.40
Total	$693.50

For repairs the company allows the following:

1 cent a mile.
$15 every six months for revarnishing.
$125 every five years for painting.

Charging of batteries costs, including labor, 70 cents per charge. The drivers are paid on a salary and commission basis, but only $30 a week is chargeable as drivers' wages.

Figures computed on one of the 1-ton electrics averaging 36 miles per day show a cost per day of $9.60 or 26.66 cents per mile. Deducting the driver's wages, the cost per day is $5.34. This truck makes ninety-five delivery stops per day, so the cost per delivery-stop is 10.10 cents, and since 600 pies are carried per trip, the cost of delivery of one pie is 1.6 cents.

This cost is low, a fact of considerable importance to the company because its delivery costs are about the only big item on which it can save any money.

The accompanying itemized figures give a record of this 1-ton truck for a 305-day year.

Depreciation is based on a total cost of $4,496.95, after the tire value of $154.30 has been subtracted, and amounts to 4.28 cents a mile on a minimum life of 105,000 miles.

Tire cost is based on a life of 10,000 miles and amounts to 1.5 cents per mile.

TOTAL YEARLY EXPENSE FOR A ONE-TON TRUCK

Depreciation	$469.91
Maintenance and repair	164.80
Tire cost	154.30
Charging cost	183.00
Battery renewals and repairs	191.40
Total	$1,163.41
Total fixed expense	449.20
Total driver's wages	1,560.00
Total annual cost	$3,172.61

Battery renewals and maintenance allow for a 40 per cent trade-in value and on the year's performance amounts to 1.74 cents per mile.

On the basis of 10,900 miles for the year, the cost per mile is 28.8 cents.

Duquesne Light Company Offers Premium for Raising Power Factor

A POWER-FACTOR provision designed to encourage customers in the improvement of their power-factor conditions has been included in a revised rate schedule recently put in effect by the Duquesne Light Company of Pittsburgh. The provision offers a premium in the form of additional discounts for the raising of power factor above a certain point and at the same time low power factor is not too severely penalized, as the wholesale light and power rate allows an average lag of 75 per cent from which point the premium or penalty discounts are computed.

The clause as it applies to the wholesale and off-peak service rates reads as follows:

Power Factor.—This rate allows an average lagging power factor of 75 per cent, which corresponds to a ratio of reactive kilovolt-ampere-hours to kilowatt-hours of 88.2 per cent (88.2 points). At the option of either customer or company instruments may be installed to measure the consumption of lagging reactive kilovolt-ampere-hours. The gross bill will then be adjusted according to the record of these meters as follows:

For each reduction of 10 points in the ratio of reactive kilovolt-ampere-hours to kilowatt-hours for any given month, a discount will be allowed on the gross bill computed at the rate of 1 per cent for each such 10 points decrease. (Maximum discount 8.82 per cent.)

For each increase of 10 points in this ratio, a corresponding charge will be added to the gross bill computed at the rate of 1 per cent for each such 10 point increase.

Reactive kilovolt-ampere-hour meters will be ratcheted to record lagging kilovolt-ampere-hours only.

Discounts and penalties for power factor shall not be applied except for periods during which the reactive kilovolt-ampere-hour meters are in service. All costs for the installation of these meters shall be borne by the party exercising the option.

Under the company's special power rate, available to customers using three-phase service exclusively for the manufacture of ice or for refrigeration purposes or for installations having similar characteristics with high load factors, the provision allows an average lagging power factor of 95 per cent, which corresponds to a ratio of reactive kilovolt-ampere-hours to kilowatt-hours of 32.9 per cent. Under this rate the maximum discount for raising the power factor is 3.29 per cent. These provisions are intended, of course, to encourage the installation of synchronous motors for constant load and long-hour use.

Contests Stimulate Employee Interest and Ability

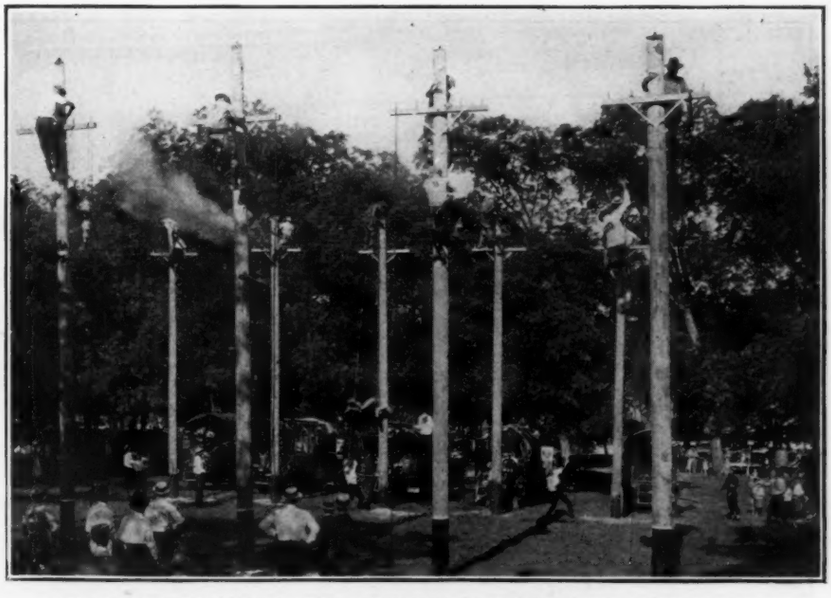
THAT contests in emergency rescue work tend to increase the efficiency of employees, who look forward to them with a great deal of interest and enthusiasm, is shown in the experience of the Dallas Power & Light Company. Last year a rescue contest was staged at the annual picnic of the employees, in which the "victim" was brought down from a pole and the prone pressure method of resuscitation applied in forty-five seconds. This year the winning team performed the same feat in the rescue contest in eight seconds less time. The illustration is unusual in that the "victim" on the third pole is on his way down while the smoke from the flash starting the contest is still visible near the top of the pole at the left. In the transformer-hanging and service-running contest the winning team put up the transformer, including double cross arm, braces, brackets and so forth, and ran the service in seven minutes and twenty four seconds.

Texas Utility Receives Mention in School Textbook

REFERENCE to a public utility company in a school textbook is unusual, but has occurred in a recent geography of Texas written for use in the schools of that state. The book is profusely illustrated, showing the industries, natural features and views of many of the principal towns. Credit is given for the use of many of the photos to individuals or organizations co-operating in the gathering of the illustration material. An even dozen of the photos relating to cities or industries and in three cases to the utility industries of the state are credited to the Texas Power & Light Company. Such credit is illustrative of some of the things involved in community work and building that at first glance appear remote so far as utility problems are affected, but help to tie the utility definitely into matters of common community interest.

Nebraska Rural Lines Practice

AN ANALYSIS of fifteen Nebraska communities served by rural lines shows that the predominating voltages are between 2,300 and 6,600. The accompanying table, which was prepared for the rural lines committee Nebraska section, N. E. L. A. by J. C. Hoge, lists the type of construction used by 784 customers. Although lightning arresters and fuses are in general use, most of the present construction



DALLAS COMPANY EMPLOYEES COMPETE IN RESCUE OF FELLOW-EMPLOYEE SUPPOSEDLY SHOCKED AT TOP OF POLE

CONSTRUCTION DATA ON RURAL LINES IN NEBRASKA

Name of Company	Location	Number of Customers	Ownership of Line	Capital Furnished By	Voltage	Arresters	Fuses	Choke Coils	Switches	Method of Meter Reading
Platte Valley Power Company	Omaha	50	Company	Customer	13,200-6,600	Yes	Yes	No	Yes	Customer reads
Southern Nebraska Power Company	Superior	7	Company	Customer	13,200	Yes	Yes	No	No	Customer reads
Water & Light Company of	Nebraska City	70	Company	Customer	13,200-2,300	Yes	Yes	No	No	Company reads
Blue River Power Company	Seward	150	Company	Customer	2,300	Yes	Yes	No	No	Customer and Company
Western Public Service	Colorado Springs	160	Company	Customer	13,200-6,600-2,300	Yes	Yes	Yes	No	Company reads
McCook Electric Company	McCook	27	Company	Company	11,000	Yes	Yes	No	No	Company reads
O. A. Cooper Company	Humboldt	6	Customer	Customer	2,300	Yes	No	No	No	Company every three months
Callaway Mill & Electric Company	Callaway	6	Company	Company	2,300	Yes	Yes	.....	.....	Company
Humphrey Electric Power Company	Humphrey	6	Company	Company	220	.....	.....	.....	.....	.....
Van Ackeren Brothers	Cedar Rapids	5	.....	.....	220	.....	.....	.....	.....	.....
Harvard Electric Company	Harvard	12	Company	Customer	220 DC.	.....	.....	.....	.....	.....
Albion Electric Light Company	Albion	15	Customer	Customer	2,200	No	Yes	No	No	Company
Jacobs Electric Company	Staplehurst	5	Customer	Customer	110 near town	.....	.....	.....	.....	Company
Central Power Company	Grand Island	90	Company and Customer	Customer	6,600-2,300	Yes	Yes	Yes	No	Company
Continental Gas & Electric Corporation	Omaha	175	Company	Customer	6,600-2,300	Yes	Yes	No	No	Company
	Total	784								

seems to omit choke coils and air-break switches. In almost all cases the ownership of the lines is in the company's hands, although the financing for the most part was done by customers. In all but two instances the company either reads or checks the customers' meter readings.

Large Model of Residential Fan Demonstrated on St. Louis Streets

A GIANT model of an electric fan was displayed on the streets of St. Louis during the week of June 16. The fan was approximately 6½ ft. high and was operated by a 1-hp. motor supplied with power from a storage battery carried on the truck. The demonstration of this model in operation on the streets attracted a great deal of interest and resulted in many sales.

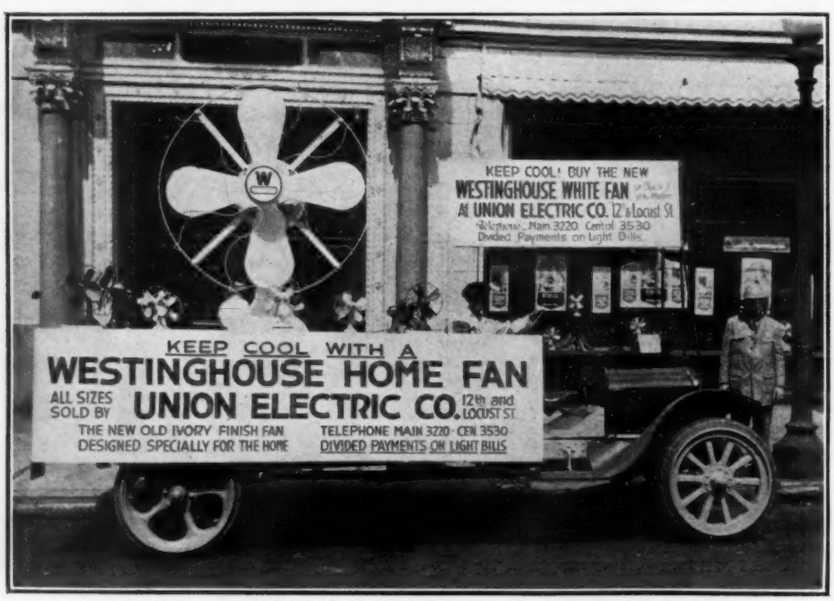
What Other Companies Are Doing

Wausau, Wis.—This city recently closed a most successful electric and food show at which the attendance was exceptionally good. For a city of 20,000 to draw an attendance of 15,000, of which approximately 11,000 were paid admissions, is an enviable record. The show was conducted under the auspices of the *Record-Herald*, but to the Wisconsin Valley Electric Company, and particularly to E. V. Pryor, is due the credit for financing and for managing the electrical features. The exhibition was held five miles from town in a park owned by the electric company. The show was self-supporting, expenses being covered by the sale of booths and the 25-cent admission charge.

Fitchburg, Mass. — The Fitchburg Gas & Electric Light Company has won for a second year and will as a result keep permanently the merchandise sales cup offered to the central station under the management of Charles H. Tenney & Company, Boston, making the best record for the past year in merchandising. The company scored 105⅜ points against 71 scored by the Malden companies, which were second in the competition. F. L. Ball is manager and F. S. Clifford sales manager of the Fitchburg company, Cyrus Barnes being general sales manager of the Tenney organization. Points were computed on the basis of percentage increase of appliance sales over 1921, percentage of gross profit, turnover, sales per meter and larger appliances sold per meter. The judges were A. B. Tenney, D. E. Manson and H. T. Sands.

South Pasadena, Cal.—An electrical contractor of this city recently sent to the Joint Committee for Business Development at N. E. L. A. headquarters in New York for a large quantity of the pamphlets entitled "Electricity in the House." He stated that he thought he could get considerable business by sending one to each person who takes out a permit. The idea seems to be a good one, and since the home builder is almost certain to have his house wired for electricity he should be told "what's what" in an installation.

Birmingham, Ala.—A commendable policy to further public relations has been adopted by the Alabama Power Company in offering five scholarships to boys and girls of the state who are ambitious to go to the state schools and have not the money to attend. Two of the scholarships are to the Alabama Polytechnic Institute at Auburn, two are to the University of Alabama and one is to the Girls' Industrial School and College at Montevallo.


KEEP COOL! BUY THE NEW
WESTINGHOUSE WHITE FAN
At UNION ELECTRIC CO. 12th & Locust St
Divided Payments on Light Bills
KEEP COOL WITH A
WESTINGHOUSE HOME FAN
ALL SIZES SOLD BY UNION ELECTRIC CO. 12th and LOCUST ST.
THE NEW OLD IVORY FINISH FAN DESIGNED SPECIALLY FOR THE HOME
TELEPHONE MAIN 3220 · CEN 3530
DIVIDED PAYMENTS ON LIGHT BILLS

SIX AND ONE HALF FOOT ELECTRIC FAN FOR STREET DEMONSTRATION

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

Fuel Oil in a Rhode Island Central Station.—N. STAHL.—The decision of the Narragansett Company to install fuel-oil burning equipment at its South Street generating station is somewhat of an innovation in general stationary power plant practice, and the work done in overcoming the many problems encountered was more or less of a pioneering nature. The undertaking represents one of the largest central stations using fuel oil exclusively, which at present is about 1,000,000 bbl. per year. The story of how the change-over from coal burning to oil burning was successfully accomplished without interrupting service, a general description of the boilers, oil burners, etc., and cost data on the entire oil-burning installation are among the subjects covered. The cost of the entire oil-burning installation was about $17 per rated boiler-horsepower, or $3.70 per kilowatt based on the kilowatt load which the boilers are capable of carrying.—*Electric Journal*, June, 1923.

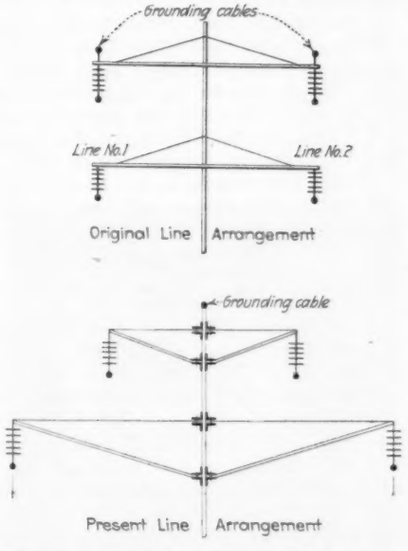
Electrical Applications in Bethlehem Plant of Bethlehem Steel Company.—D. M. PETTY and A. J. STANDING.—Electrically operated equipment is the most important factor in high efficiencies and enormous tonnages that are produced in this steel plant. In the first part of this article the authors describe the power generation and distribution features, while the second part, which will be in the July issue, describes the application of electricity in the manufacturing department of the steel plant. A detailed description is given of all of the generating units, both direct current and alternating current, and is followed by a method of distributing the power throughout the plant.—*Blast Furnace and Steel Plant*, June, 1923.

Pueblo Plant of the Southern Colorado Power Company.—A short description of the 14,600-kw. steam plant at Pueblo. This plant consists of a new 7,500-kw. turbine unit and 7,100-kw. older engine and turbine-driven generators that are called upon for emergency use only. For the new turbine installation, special coal and ash-handling systems have been initiated. The author also considers the evaporator system for make-up water and describes a unique method of driving the circulation water tunnel.—*Power*, June 12, 1923.

Hydro-Electric Developments in Ontario.—F. A. GABY.—A review of the power situation in Ontario, and the principal features of all hydro-electric power plants acquired, constructed and operated by the Ontario Hydro-Electric Commission are the main subjects considered in this paper. The territory under the jurisdiction of this company has a possible water-power development of 6,000,000 hp., of which about 1,300,000 hp. has been developed.—*Canadian Engineer*, June 19, 1923.

Transmission, Substations and Distribution

Experiences with a High-Tension Line in Mountainous Terrain.—O. USBECK.—A double single-phase 80,000-volt line, feeding the electrified main road between Lauban and Königszelt in Silesia, crossing a very mountainous region of extremely severe climatic conditions, has given cause to numerous breakdowns due mostly to storms and sleet on the wires. The author describes these failures and tries to suggest remedies. Originally one grounding cable and the two wires of one phase, all three in the same vertical plane, were carried on each side of the towers. Irregular sagging of these wires when coated with sleet caused frequent short circuits with melting of the cables. Arranging the wires in three different planes above each other remedied most of these troubles. The grounding cables, instead of protecting the line, caused still more trouble than the main conductors, so that finally only one of them was laid out, spanned between the tops of the towers. A comparison between the original (1914) line and the present line is seen from the accompanying sketches. In some cases the break of the cables caused the complete collapse of the adjacent steel towers. This was due to an unusually heavy deposit of sleet upon the wires, estimated at 4 kg. per meter. The author points out that the new V. D. E. sleet load specifications seem to be many times too low for severe climatic conditions.—*Elektrotechnische Zeitschrift*, June 21, 1923.



RECONSTRUCTED LINE DECREASES TROUBLE CAUSED BY SLEET

Three years of service of the "Anomima per Elettroagricoltura" (A.P.E.) of Bologna.—F. CARNEVALI.—A very interesting report of what this electro-agricultural company has done during its three years of existence. It has at its disposition a network of about 130 km. of transmission lines, and about 3,000,000 lires worth of apparatus; it is able to perform all kinds of farm work at a reasonable rate. The author explains how the company was formed, and how it has developed and tells how the power is generated, furnished, transmitted, transformed, delivered and utilized. He gives many details about the apparatus the company owns. The various costs of the different operations are mentioned.—*Elettrotecnica*, June 5, 1923.

Changing from Two-Phase Four-Wire to Three-Phase Four-Wire Distribution.—A. HUSSEY and R. A. PAINE, JR.—During the last half of this year the Brooklyn Edison Company expects to change approximately 30,000 kva. from two-phase four-wire, 2,400-volt distribution to a three-phase four-wire 2,400/4,150-volt system. This article takes up the general methods that are proposed for doing this work and represents very careful forethought by the company's engineers.—*Electric Journal*, June, 1923.

Three-Phase Auto Transformer Connections.—F. A. DAHLGREN.—A discussion of the relative advantages of various methods available for the connection of three-phase auto-transformers, giving formulas and curves relating to each method.—*Electrician* (England), June 8, 1923.

General Considerations in Grounding the Neutral of power Systems.—H. H. DEWEY.—An abstract of this paper may be found in the ELECTRICAL WORLD report of the A.I.E.E. spring convention, May 5, 1923, on page 1020.—*Journal of the A.I.E.E.*, June, 1923.

Generation, Control, Switching and Protection

Selective Relay System of the 66,000-Volt Ring of the Duquesne Light Company.—H. P. SLEEPER.—An abstract of this paper may be found in the ELECTRICAL WORLD report of the A.I.E.E. spring convention, May 5, 1923, on page 1027.—*Journal of the A.I.E.E.*, July, 1923.

Power Developments in Japan.—W. W. LEWIS.—The author considers the topography and climate of the country, the power available, the principal uses of power, construction work which follows closely that of American practice and some general statements as to operation and government regulations. Typical distribution practice is outlined with the use of drawings, and several tables give the various

companies operating, where located, output of stations, substations and transmission line voltages.—*General Electric Review*, July 1923.

Units, Measurements and Instruments

Standardized Insulator Tests.—An abstract of this paper may be found in the ELECTRICAL WORLD report of the A.I.E.E. spring convention, May 5, 1923, on page 1032.—*Journal of the A.I.E.E.*, July, 1923.

Development in Alternating-Current Instruments.—PAUL MACGAHAN.—One of the most important recent developments in alternating-current instruments is the design of a complete line of instruments operating on the dynamometer principle. In the instruments described, this principle of operation is used with only slight modifications for the production of voltmeters, ammeters, single-phase and polyphase wattmeters, power-factor meters and frequency meters. An ideal condition results from both a manufacturing and application point of view, when practically one mechanism or movement can be used for such a wide variety of purposes, and for all kinds of applications which require the measurement of electrical quantities.—*Electric Journal*, July, 1923.

Motors and Control

Phase Compensator.—J. BECKMANN.—Any synchronous motor may be used advantageously as a phase compensator, particularly in systems with many small motors. From a simple triangle-d agram may be found how much wattless current remains available if the synchronous motor is also called upon to deliver mechanical power. For drives with low starting torque and small load variations, over-excitation may be used to improve the current displacement of the system. Where, beside small motors, a number of large units are operating on the net, a special three-phase exciting machine is advocated, which consists of a direct current armature, driven by a small motor. The brushes upon the commutator of this armature are connected to the collector rings of the main motor. With such a compensator set the power factor of the main motor can be kept at unity even at no-load run of the motor. Connecting diagrams and resulting power-factor curves illustrate the use of these compensators.—*A. E. G. Mitteilungen*, May, 1923.

The Electrical Equipment of a Cotton Mill.—A description is given of one of the mills of the Dunlop Rubber Cotton Mills, Ltd. The mills are entirely electrically driven and consist of large spinning and weaving establishments equipped with up-to-date machinery for the production of cotton cord, fabric, etc., used in the manufacture of cord tires. Energy is received at 10,000 volts and transformed to 400 volts in two substations which will have an ultimate capacity of 16,000 kva. The article is well illustrated.—*Electrical Review* (England), June 8, 1923.

Heat Application and Material Handling

Autogenous Welding.—CARLO BOTTINI.—This article embraces several methods of welding (oxy-acetylene, oxy-hydrogene, pure electrical, and Goldschmidt process) in which two parts of the same metal are joined in a homogeneous manner, the joints being made by the intermingling contacts of the fibers of the material to be welded, so that the finished piece is one of uniform quality and properties throughout. Each method is fully treated and illustrated, and all the various technical characteristics of these welding processes are given.—*Ingegneria*, Vol. II, No. 3.

Effect of Electric Cooking Upon Station Load.—C. HÄSSLER.—A small but prosperous suburb of Stockholm, Sweden, has today, after a five-year propaganda for electric cooking, reached the point where over 20 per cent of its connected houses have a complete electric kitchen. Data and load curves are given in this paper, to show how this extensive electric cooking affects the load demand upon the station. Light and power are separately metered, the latter with double-rate meters, depending upon the time of the day. The average consumption per connection is 190 kw.-hr. for light and 1,750 kw.-hr. for cooking per year. The load for cooking is on the average 323 kw.hr. per person per year or 0.9 kw.-hr. per person per day.—*Elektrotechnische Zeitschrift*, June 7, 1923.

Traction

Regenerative Braking on Single-Phase Locomotives.—The article describes in full detail the latest type of regenerative train braking on 16⅔-cycle single-phase locomotives, as installed on several hilly branches of the Swiss Federal Railways. Connection diagrams, wattmeter records and vectors are used to explain the novel system. On an average 30 per cent of the energy required for the up-hill pull of a train is being returned into the overhead lines on the down grades. While resistance braking can only serve to reduce the train speed to a certain value, the new regenerative system is independent of speed and may bring the train to a complete standstill. The operation of the brake is very simple and eliminates faulty manipulation. So reliable is the new braking that it is regarded as a fully dependable emergency brake in case of trouble on the vacuum braking system.—*Bulletin Oerlikon*, May, 1923.

Steam Accumulator for Railway Power Stations.—K. MAYR.—The extremely fluctuating load of steam power stations supplying electric railroads makes it necessary to either provide such large boilers that their temporary forcing generates sufficient quantities of steam to cope with peak loads, or else a floating storage battery of ample capacity is called upon to cover the fluctuations. Neither of these two common methods is economical. A large boiler operated at only fractional load is inefficient, and losses in a storage battery, including the necessary booster motor-generator, may rise as high as 35 per cent. The recently developed and now perfected Ruth steam accumulator is claimed to be the best solution of this problem with an over-all efficiency far greater than the above-mentioned systems. On an assumed example, a power house of 4,000 kw., with a typical traction load, comparative data are given for operation without and with such an accumulator, which is kept charged with the full pressure boiler steam. The required investment of an adequate steam plant without accumulator is 16.7 per cent higher than that of an equivalent plant with steam storage. A saving of roughly 10 per cent per year on the indirect expenditures may be realized in the station with the accumulator.—*Siemens Zeitschrift*, June, 1923.

The Electric Railways of Iowa.—Iowa has twenty-eight electric railways operating nearly 1,000 passenger cars and more than 3,000 freight and work cars on approximately 1,100 miles of track. A general description is given of each of the railways in this state, with particular attention given to the equipment and freight handling facilities. Power requirements and passenger and freight rates are among other subjects considered.—*Electric Traction*, June, 1923.

Electrophysics, Electrochemistry and Batteries

Permanent Magnets, and the Relation of Their Properties to the Constitution of Magnet Steels.—E. A. WATSON.—The first part of the paper deals with the properties required in a permanent magnet, while the second part deals with the case of magnets which are microscopically not of uniform composition and which contain two principal constituents. Data taken chiefly from modern cobalt steels are given in support of the theories put forward, and some suggestions are made for further research and development work in this connection.—*Journal of the Institution of Electrical Engineers* (England), June, 1923.

Telegraphy, Telephony, Radio and Signals

Advantages of Condensors in Combination with Telephone Transformers.—ARVID HOLMGREN.—The author shows that the introduction of suitable capacities in the primary and secondary circuits of a telephone transformer will improve its characteristics and reduce the damping. A mathematical deduction for commutation of the suitable capacity is given. A transformer of this kind will have a characteristic that is almost independent of the frequency as well as a damping that is practically one half of that of an ordinary transformer without capacities.—*Teknisk Tidskrift* (Swedish), *Elektroteknik*, June 2, 1923.

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Niagara Diversion Board Soon to Be Appointed

The Canadian government has agreed to the plan proposed by the United States for the measurement of the diversion from the Niagara River. The measurements are to be made under the supervision of a board to be composed of two members, one to be appointed by the Canadian government and the other by the United States. The American member of the board undoubtedly will be Major P. S. Reinike, the district engineer of the War Department at Buffalo. Canada is expected to appoint William Stewart as its member of the board.

Six Months' Gain in Business Offsets Rate Decrease

In a statement given to the San Francisco press last week by A. F. Hockenbeamer, vice-president and treasurer of the Pacific Gas & Electric Company, the statement is made that increased earning capacity resulting from the rapid growth of the company's business has offset the effect upon gross revenues of the substantial reductions made in both gas and electric rates during the past year. In the first half of 1923 gross revenues increased $290,747 over the same period of 1922. Operating expenses, owing primarily to reduced oil costs resulting from lower price of fuel oil and larger proportion of hydro-electric energy available, decreased $574,013 the first half of the current year, an increase in net income of $864,760 being thus registered. In the six months ended June 30, 1923, sales of electricity increased 57,277,188 kw.-hr., or 11.6 per cent.

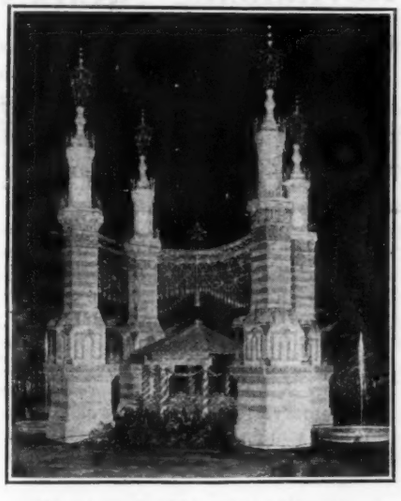
Southern California Edison Plans New Capitalization

A great increase in capital is planned by the Southern California Edison Company. To adjust the financial structure to the growth of the company's business, the stockholders will be asked on Sept. 7 to approve proposals to increase the authorized capital stock from $100,000,000 to $250,000,000, to consist of $125,000,000 common and $125,000,000 preferred; to authorize $250,000,000 of bonded indebtedness, and to approve the execution of a new mortgage to secure the newly authorized bond issue. Stockholders will be offered the privilege of buying the new stock at $100 a share in the ratio of one new share for every ten now held.

The increased authorized capitalization will provide, according to President John B. Miller, a broad and strong foundation for financing through to completion more than 1,000,000 additional horsepower to be installed at the company's Big Creek water power project, together with extensions of its transmission and distributing system, on account of which the expenditures in the next ten years are estimated to amount to approximately $200,000,000.

Tower of Jewels for Cincinnati

A striking and impressive feature of the Cincinnati Fall Festival and Industrial Exposition, to be held at Cincinnati from Aug. 25 to Sept. 5, will be an elaborate display of ornamental lighting in Washington Park. This display was designed by W. D'A. Ryan,



DISPLAY FOR CINCINNATI FESTIVAL

director of the General Electric Company Illuminating Engineering Laboratory. There will be a tower with Oriental minarets, 90 ft. high, decorated with "Novagem" jewels. The light from forty 18-in. searchlights will be thrown on these. Twenty other searchlights of the same size will be used.

General Electric Issues More Bonds for Employees

An additional issue of $2,500,000 of bonds by the General Electric Employees' Securities Corporation, which pay 8 per cent so long as the original holder remains an employee of the General Electric Company, has been announced by President Gerard Swope. The first issue of $5,000,000 of bonds was announced Feb. 8, and the demand of employees so far exceeded the amount available that this second issue has been arranged.

The bonds are 6 per cent fifty-year securities issued in multiples of $10. The company agrees with the holder to pay an additional 2 per cent so long as he remains with the company.

According to a recent report of the comptroller, employees of the General Electric Company have to date acquired nearly $28,000,000 in the company's securities.

Salt River Valley Project Bonds Found Legal

Passing on three disputed points, the Supreme Court of Arizona has sustained the validity of an issue of $1,800,000 in bonds made a few months ago by the Salt River Valley Water Users' Association and sold in March through a Los Angeles firm.

Most of the money will be expended in construction of the Mormon Flat dam in the channel of Salt River, 42 miles east of Phoenix. This structure is to be 160 ft. high, 320 ft. long on top and only 90 ft. in channel width at the bottom, in a narrow box canyon declared ideal for the installation. It will back up less than 100,000 acre-feet of water and is to be used only as a supplemental storage basin for water that may be passed through the Roosevelt Dam for power needs. The agricultural supply hereafter is to be regulated at Mormon Flat instead of the more distant Roosevelt.

Not only will the dam permit installation at Roosevelt of an additional 7,000-hp. generator, bringing the rating of the plant to 20,000 hp., but this gross power will be available continuously, instead of occasionally as at present. A profitable market for the power already is waiting in the mines of central Arizona, for industrial needs around Phoenix and for the pumping of water on the farming areas around Casa Grande and Tucson.

Work on the project has already been started. When the dam shall have been completed it is expected that work will be started on a second and larger structure 10 miles upstream at Horse Mesa. This is to be a power dam, about 235 ft. high and with a large storage basin. No power will be generated at Mormon Flat.

To Deal with Power Export

Question of American Relations to St. Lawrence Development Before Ottawa Government

ACCORDING to articles in the *Financial Post* of Toronto, the Canadian government has not yet decided on a permanent policy regarding the export of power to the United States. Much power is now being exported at Niagara and from the Quebec privately owned systems, but the position of any new company developing power for export would be so insecure that capital could not be interested in the investment of millions in permanent works upon the chance of the government policy being favorable. What would be required would be the assurance of the privilege of export over a term of many years.

With this question is closely bound up the development of water power on the St. Lawrence. It is argued in Canada that the Dominion could obtain a substantial revenue from an export tax on the 4,000,000 hp. that could be developed on the Canadian side of the river. It is recognized that most of the power would go to industries in the United States. Moreover, the control of this power would put Canada in an enviable position to bargain with the United States on coal and the tariff.

On the other hand, if Canada proceeded with the water-power development and sold power in the States, a somewhat difficult situation might be created when Canadian industry expanded to the point where large quantities of the power would be needed in Canada. It might be difficult to divert power from the United States to Canada without causing international ill feeling—such complications, for instance, as the proposed embargo on the export of pulpwood is causing.

PROJECTS AWAIT DECISION

Among projected developments awaiting the decision of the Canadian government on power exportation is that of the Frontier Corporation, controlled in the United States, for which Col. Hugh L. Cooper has submitted definite plans (see ELECTRICAL WORLD, July 28, p. 196). These plans, according to the *Financial Post*, are branded as "propaganda" by officials of the Hydro-Electric Power Commission of Ontario, who oppose private development of the great water powers of the lower province, but among business men of Quebec have created much discussion.

Another contemplated development is concerned in the application of the National Hydro-Electric Company, Ltd., of Montreal for permission to raise the level of the dam at Carillon on the Ottawa River to 133 ft. In 1911 this corporation obtained a license which permitted the development of only a small amount of power. In 1921 this was changed so as to permit the raising of the level of the dam to 94 ft. Since then the demands for power have so increased that the promoters, the Robert group of Montreal, with whom are associated important American capitalists, now need a much higher level.

One of the most important features of the project is that undoubtedly a very large portion of the power developed would be sold in the United States. That big things are contemplated is evident from reports that the expenditure may amount to $30,000,000.

NEW YORKERS VISIT LONG SAULT

A conference in which representatives of chambers of commerce and boards of trade of towns in northern New York, Canadian public men and others were to take part was called to meet in Cornwall, Ontario, on Thursday. It was to be addressed by Charles P. Craig of Duluth, Minn., vice-president of the Great Lakes and St. Lawrence Tidewater Association, and the participants were to proceed to the Long Sault Rapids to listen to an explanation from engineers of the canalization and power projects.

Representative Dempsey Urges Immediate Development

Wallace Dempsey, chairman of the rivers and harbors committee of the United States House of Representatives, conferred with Premier Ferguson of Ontario at Toronto on Tuesday last. Mr. Dempsey is of the opinion there should be immediate development of the St. Lawrence by private interests.

"Canada has intimated to us that she is not ready to go ahead with the development at the present time," said Mr. Dempsey. "That being the case, I think it should be developed privately. Private capital is ready for such an undertaking."

Reclamation and the Colorado River

F. E. Weymouth, chief engineer of the Bureau of Reclamation, Department of the Interior, with his headquarters in Denver, has just returned to that city after a visit to Washington. Mr. Weymouth says that delay on the part of any state in ratifying the Colorado River treaty will not necessarily result in delay in the development of the Colorado River project from a reclamation point of view. He adds that there is no reason why the bringing of water from the western slopes through the Moffat Tunnel, now being bored, should not be carried out successfully, with vast benefits to Denver and surrounding territory, and that the plan is wholly practicable.

Revitalizing N.E.L.A. Commercial Section

Organization Meeting Held at Association Island, N. Y., Determines to Re-enlist Support of Former Chairmen and Frame Convention Program of Inspiring Kind

IN SO far as is possible, the detail work of the National Electric Light Association Commercial Section will be done this year in the committees of the geographic divisions. This policy was definitely announced at the organization meeting of the Commercial Section held on Friday and Saturday of last week at Association Island, Henderson Harbor, N. Y. A determined effort is to be made this year, under the leadership of Chairman N. T. Wilcox, to revitalize the Commercial Section and raise it to a higher standard of usefulness, on a plane with the other sections of the association.

A committee was appointed to devise a method of re-enlisting the support and services of the ex-chairmen of the section, who have for a number of years dropped out year after year and lost interest. Plans were discussed looking to a convention program that would provide something to interest and inspire the executive by bringing men of distinction from outside the industry to talk upon commercial problems in which the central-station company is concerned. "National convention sessions," said Mr. Wilcox, "should be something more than glorified committee meetings. Much of the detail work we have been doing in the national section is better done and discussed in the meetings of the geographic divisions, the national section assisting and reporting to the industry through the *N. E. L. A. Bulletin* and the electrical press." The method by which it is hoped that this result may be accomplished will be reported to the next meeting of the Commercial National Section executive committee, which will be held in New York in September.

The N. E. L. A. wiring committee held its first meeting of the year on the day preceding. Chairman R. S. Hale reported that the standardization of the plug on the appliance end of attachment cords has progressed to the degree where manufacturers have agreed on one type of round prong and one type of flat prong, and only these are now being produced. It now remains to bring about the universal adoption of one of these.

The committee decided to make a study of the "thoroughly grounded neutral" to determine whether if the neutral is made solid throughout and is adequately protected as by conduit and safely grounded at all points, bare wire can be used at a considerable saving in cost.

An appropriation of $2,000 was voted to help finance the cost of establishing a field secretary for the National Fire Protection Association electrical committee, who will work to unify wiring practice throughout the country.

Maryland Utilities Body

Representatives of Fifty-three Companies Meet with State Commission for Organization

TO PERFECT the organization of the Maryland Public Utilities Association, representatives of fifty-three utility companies met with the State Public Service Commission on Thursday, July 26, in the chamber of the House of Delegates at Annapolis.

In his address to the members of the association, Governor Albert C. Ritchie spoke on "Service." He suggested that the association should substitute the name "Service" for "Utilities" in its corporate title so that its very name would bespeak the aims of the officials and employees of the companies composing the association.

Service, said the Governor, meant the realization by officials of public utilities that they are servants of the public or quasi-public officials. Their duties to the public are as high as, and even more intimate than, the duties of public officials duly elected by the people. People today depend so much in the daily routine of their lives upon the water, gas, electricity and railway companies that the service these corporations render must be of the right kind; it should be constant, honest and courteous. The Governor declared that the meeting was one of the most progressive steps the state had taken in years, and he urged upon the representatives present that they take the people more and more into their confidence.

President Coblentz' Address

Emory L. Coblentz, president of the association, who is also the president of the Potomac Public Service Company of Hagerstown and Frederick, Md., accentuated the value of co-operation with the public and showed the pleasure he felt because of the interest aroused. "Through our organization," he said, "every utility in the state may gather lessons which other organizations have learned through hard experience. The Public Service Commission, which really started the move, will have its work lightened when it works with an organization whose sole aim is service. We can now adjust many of our minor troubles, and, what is more important, we may avoid many of them."

Excoriating the "public-be-damned" policy which, he said, unfortunately appeared to be the attitude of a good many public utility companies until recently, Charles M. Cohn, vice-president of the Consolidated Gas, Electric Light & Power Company, Baltimore, spoke of the rapid progress that could be made through co-operation. "The public-be-damned spirit of our forefathers is antique and not wise in our day," Mr. Cohn said. "I have seen this tried. Our lines of business will never run with any smoothness until we have learned a lesson in common courtesy and have forced our employees to follow our example. We cannot successfully disregard our customers' feelings any more than a merchant in a highly competitive business can."

Among other speakers were C. D. Emmons, president United Railway & Electric Company, Baltimore, and president American Electric Railway Association; Labert St. Clair, director advertising section, American Electric Railway Association; George F. Oxley, director of publicity National Electric Light Association, and representatives of the electric light, telephone and gas companies.

Membership dues were determined upon a sliding scale based on the gross earnings of the companies and ranging from $10 to $700.

Permanent headquarters for the organization were chosen at the Engineers' Club, Baltimore. Governor Ritchie entertained the entire delegation at luncheon in the Executive Mansion.

Commonwealth Edison Reduces Rates

Acquiesces Cheerfully in Commission's Desire for a Decrease of 1 Cent in First Step of Tariff—Reductions Also to Be Made by Northern and Central Illinois Companies

ORDERING a reduction in Chicago gas rates, the Illinois Commerce Commission on July 25 announced at the same time changes effecting decreases in the rates for electrical energy in that city and elsewhere in Illinois.

In a preliminary letter addressed to the Commonwealth Edison Company suggesting a lower rate, the commission said: "The commission recognizes that the rates of the Commonwealth Edison Company are appreciably lower than those charged for similar service in practically all comparable cities. Nevertheless, after such consideration as under the circumstances it is able to give to the reports of the company, the commission is of the opinion that the company can make a reduction of substantially 1 cent per kilowatt-hour in its general tariff, which, as it now is in effect, is 9 cents for the first 30 kw.-hr. of maximum demand, 5 cents for the second kilowatt-hour block and 3 cents for the succeeding kilowatt-hours. This reduction may be effected by reducing the first step rate from 9 cents to 8 cents. The reduction in the tariffs will bring a saving to the users of the service of substantially $1,300,000 a year and a like reduction in the income account of the company, and in view of the foregoing the commission is satisfied that such adjusted tariffs will be fair and reasonable. In view of all these facts, the commission therefore directs the filing of tariffs in compliance with the foregoing recommendations."

At the time this letter was received Samuel Insull, president of the company, was in New York. Upon his return to Chicago he wrote the commission as follows:

"Upon my return to the city today I find your letter of the 25th suggesting a reduction of 1 cent per kilowatt-hour in the initial portion of the company's general tariff for electric service. In reply, I beg to say that the company is ready to adopt the suggestion and will immediately file tariffs in accordance therewith, effective as to all bills rendered for meters read on and after Aug. 1, 1923.

"The company appreciates the commission's recognition of the fact that the company was able to go through the world war and the period subsequent thereto without seeking the relief of increased rates and that its rates are appreciably lower than the rates charged for similar service in practically all cities comparable with Chicago.

"It is true, as you state, that the business of the company has shown a marked increase in volume. For instance, during the year 1922 there was an increase in its maximum load of more than 14 per cent over that of the preceding year, and there was also a substantial increase in its output of energy. On the other hand, its operating expenses, including the cost of labor, materials and money, have been high during the past few years, and there has been comparatively little decrease since the peak of prices following the war. Nevertheless, I believe that as a result of the increase in the volume of its business and on account of the increased economy and efficiency in the production and distribution of electricity, the company can safely make the reduction in its rates which the commission suggests. The reduction is in accord with the policy of the company to reduce its rates as rapidly as reductions can be made consistent with good service and with the interest of those who have invested money in its properties."

Other Rate Reductions

Rates for the Public Service Company of Northern Illinois were reduced upon the commission's order. There was a 1-cent cut per kilowatt-hour in the first step rate for the electric light consumers on Schedule A, which will be effective Aug. 1. Then a further reduction of 1 cent per kilowatt-hour for the first step block rate is called for Jan. 1, 1924.

Rates down the state were also changed by order of the commission, the Central Illinois Public Service Company being required to bring its energy rate for the first maximum-demand block step to 13 cents a kilowatt-hour. This will affect about 75,000 consumers in 161 localities.

Tennessee River Projects

Knoxville Power & Light Applies for Two More Sites—Initial Work on Deschutes Plan

THE Knoxville Power & Light Company is anxious to make more comprehensive its proposed development on the Clinch and Powell Rivers and has asked permission of the Federal Power Commission to amend its original application by adding the Coulter Shoals and Marble Bluffs sites to the four sites covered in the original application. The two new sites are on the Tennessee itself, in Blount County.

The Coulter Shoals development is to include the construction of a dam 53 ft. high and 1,200 ft. long, with provisions for locks for navigation and an installed capacity of 48,000 hp. The Marble Bluffs dam is to have a height of 35 ft. and will be 1,400 ft. long. At that point 44,000 hp. is to be developed. This brings the total of the proposed installation on the six sites to 292,000 hp.

The great advantage in adding to the project the two Tennessee River sites is that during high water the load can be carried on the Tennessee River plants. No storage other than that for daily regulation can be had on the Tennessee, but on the Clinch and the Powell run-off can be stored in the large reservoirs that form a part of the proposed development. The situation is such as to permit of the application of exactly the same plan resorted to by the Alabama Power Company on the Tallapoosa and Coosa Rivers.

COLUMBIA VALLEY COMPANY'S PLANS

Reports to the Federal Power Commission indicate that the Columbia Valley Power Company is well advanced in the engineering studies prescribed in its preliminary permit for the development of the Metolius and Pelton sites on the Deschutes River, near Madras, Ore. These engineering investigations have disclosed no unfavorable facts and indicate that very cheap power is likely to be developed. It is the plan of the company to develop the Pelton site first. The Metolius sito will necessitate a much larger development, which will not be undertaken until a market has been developed.

Owing to the low cost at which it now is estimated that this power can be furnished, it is expected that the development will have an important bearing on the public utility and industrial situations in Portland and vicinity.

Murder of American Electrical Man in Mexico

Mexican correspondents of newspapers published in El Paso have telegraphed that M. Marion, an American, who managed the electric light and power company at Orizaba, in the State of Vera Cruz, Mexico, was stabbed to death on July 30 by radical workmen on the streets of the town.

Messages say that police, state officers and the military are hunting the assassins. Several other crimes in the past few weeks were committed by the radicals, the correspondents assert.

Coal-Storage Investigation of F. A. E. S. Under Way

The storage-of-coal study undertaken by the Federated American Engineering Societies in co-operation with the United States Coal Commission and the Department of Commerce is now in full swing throughout the country.

Definite organization of the work is announced by the president of the Engineering Federation, Dean Mortimer E. Cooley of the University of Michigan, who states that 107 committees, comprising more than 500 engineers, are actively pursuing the inquiry, the aim of which is to aid in solving the nation's fuel problem, which this winter may become acute. Probably 200,000 engineers, directly or indirectly, are assisting in the coal-storage study, according to Dean Cooley. It is hoped to complete the study by fall.

The chairman of the main committee is W. L. Abbott of Chicago. Additions to the personnel announced recently include R. V. Norris of Wilkes-Barre, Pa. Dean Perley F. Walker of the University of Kansas has been chosen to direct the field organization and is now working in the Central West and the South.

Season Affects Utility Financing

THE low absorbing power of the public during the summer season probably accounts for the reduced volume of new electric light and power issues brought out during the month of July. The total amount of new offerings of bonds and notes of this type of security was only $23,080,000, the lowest total of the year. This lull is not inconsistent with conditions existing last summer, when utility financing showed a tendency to decline during July and August. The largest single issue of the month—in fact, one of the largest pieces of public utility financing during the summer—was $7,192,000 of bonds of the Interstate Public Service Company offered at 91½ and yielding 6.70. It is interesting to note that preferred-stock offerings, which played a conspicuous part in electric light and power public utility financing during the early months of the year, do not appear among July's flotations. Long-term securities continue to predominate, and the rate of return advanced to 6.58, the highest point reached in the current year.

In spite of the seasonal slump electric light and power public utility financing for the seven-month period just ended shows an increase of more than $54,000,000 over the total reached during the same period last year.

SECURITY ISSUES OF ELECTRIC SERVICE COMPANIES IN JULY

Name of Company	Amount of Issue	Period Years	Class	Purpose	Interest Rate	Price	Per Cent Yield
Jersey Central Power & Light Corp.	$1,250,000	10	Convertible debenture gold bonds	Construction	7	98¼	7.25
Metropolitan Edison Co. (Pa.)	1,000,000	29	First and refunding mortgage gold bonds, series B	Capital expenditures	6	97½	6.20
San Diego Consolidated Gas & Electric Co. (Cal.)	1,438,000	24	First and refunding mortgage gold bonds, series C	Construction	6	98	6.15
Northern States Power Co (Minn.)	3,000,000	18	First and refunding mortgage gold bonds of 1916	To reimburse for expenditures and extensions	6	99½	6.00
Ohio Public Service Co	500,000	30	First mortgage and refunding gold bonds, series C	Construction and corporate purposes	6	94½	6.40
Virginia-Western Power Co. (Va.)	3,500,000	30	First mortgage sinking-fund gold bonds, series A	To reimburse for retiring bonds, acquiring properties and corporate purposes	6	95	6.32
Penn-Ohio Edison Co	3,250,000	3½	Gold notes	For acquisition of securities of controlled companies	6½	98	7.15
United Light & Railways Co. (Mich.)	1,000,000	29	First lien and consolidated mortgage gold bonds, series A	To reimburse for additions and improvements	6	96½	6.25
Commonwealth Light & Power Co. (N. Y.)	600,000	2	Secured gold notes	Refunding, additions and improvements and other purposes	7	99½	7.25
Eastern Iowa Power Co.	350,000	20	First (closed) mortgage gold bonds	Construction and development	6½	97½	6.75
Interstate Public Service Co. (Ind.)	7,192,000	25	First mortgage and refunding gold bonds, series A	Refunding and corporate uses	6	91½	6.70
Total	$23,080,000						

Interconnection Economics

Fall River District Executives Give Valuable Testimony Before the Massachusetts Commission

THROUGH the construction of the Montaup Electric Company's tidewater power station in the Fall River district of Massachusetts and the interconnection of the central stations at Pawtucket and Woonsocket, R. I., Fall River and Brockton, Mass., it is estimated that an investment of $3,000,000 in plant will be saved, according to testimony before the Massachusetts Department of Public Utilities last week in the capitalization case of the Montaup company. Roy F. Whitney, president Fall River Electric Light Company; M. L. Sperry, vice-president Blackstone Valley Gas & Electric Company, and A. Stuart Pratt of Stone & Webster, Inc., vice-president Edison Electric Illuminating Company of Brockton, set forth the advantages of interconnection and of the co-operative plan by which these companies expect to develop the Montaup plant. S. H. Mildram, for the city of Fall River, opposed the project pending a more extended demonstration of its economic justification, contending that, under an existing contract with the New England Power Company, the Fall River company should seek to increase its capacity through the purchase of additional energy rather than through the building of the Montaup station. H. I. Harriman, president of the New England Power Company, asserted that future hydro-electric developments to serve New England rendered the purchase of additional water power a logical step for the Fall River central station.

PRESIDENT WHITNEY'S ARGUMENT

President Whitney reviewed at length the negotiations of the Fall River company with the New England Power Company, concluding that the offered prices of the latter of between 12.5 and 13 mills per kilowatt-hour exceed the estimated cost of production at the proposed Montaup plant. He pointed out that the starting of an electric rate case in Fall River within a few days of the inauguration of a new city administration had resulted in premature publicity for the Montaup plan and that this had caused an overnight rise of $90,000 in the price of the station site under consideration.

Opponents of the Montaup plan wanted to know why the Fall River company did not purchase energy from the new Weymouth plant of the Boston Edison Company, which is seeking maximum efficiency in production. Mr. Whitney replied that the same type of equipment is contemplated for Montaup as for Weymouth and that there is a fuel differential of approximately $1 per ton of coal in favor of Montaup. The demand for power is so great in Fall River, a city of 111 cotton mills, that at present five mills are unable to secure power from the Fall River company, and the provision of new generating facilities is absolutely essential to the growth of the community. Mr. Whitney said that the greater reliability of locally produced power as compared with transmitted power is an important consideration in a city like Fall River, with its 150,000-hp. industrial development. By 1929, if no steps are taken to develop additional plant, the Fall River load of 50,000 kw. will have to be supplied 80 per cent from outside. This year there has been no opportunity to purchase surplus power. In ten years there will be an estimated saving of $2,000,000 to Fall River if the Montaup plant is built and interconnected with the Blackstone Valley, Brockton and Fall River systems.

Mr. Pratt said that interconnection would save a 30,000-kw. unit through utilization of load-factor differences in the systems. The hearing was continued.

Interconnection Idea Is Spreading in Maine

An important interconnection program has been under consideration lately in Maine by which the systems of the Cumberland County Power & Light Company, Portland; the Central Maine Power Company, Augusta, and the Bangor Railway & Electric Company will be tied together to enable the benefits of this policy to be reaped by more than 80 per cent of the power users of the state. All three of these companies operate extensive hydro-electric plants and lines, and the first two named own valuable auxiliary steam plants. The water-power stations are located on some of the chief watersheds and are in a position to take advantage of the diversities of rainfall and run-off through interconnection. More than $50,000 a year has been saved in operating costs by the interconnection of the plants of the Central Maine system on the Androscoggin and Kennebec Rivers. While details of the plan are not yet fully determined, it is expected that the Cumberland-Central Maine tie line will follow the Portland-Lewiston interurban right-of-way, and that one of the first steps will involve the construction of a switching and substation at West Falmouth at a cost of from $150,000 to $200,000. Fred D. Gordon is general manager of the Cumberland County Company, W. S. Wyman of the Central Maine Company and E. M. Graham of the Bangor Company.

New Hydro-Electric Plant for Keene (N. H.) Utility

Construction has begun of a hydro-electric plant of 2,000 kw. rating near Marlboro, N. H., for the Keene Gas & Electric Company. The plant will be built on Minnewawa Brook and will utilize the run-off of Dublin Lake and Mount Monadnock streams. From a storage dam 60 ft. high and 6,000 ft. above the station water will be delivered to the plant by a wooden-stave penstock, the normal head being 275 ft. Improved storage facilities will benefit the company and local mill owners alike. Energy will be delivered to Keene at 13,000 volts. The Keene company is already connected with the New England Power Company's transmission system, and the new installation is expected to benefit both local service and intercompany requirements. It is hoped to complete the plant by Dec. 1. L. H. Shattuck, Inc., Manchester, N. H., is handling the construction.

Central Connecticut Company Expands

The Central Connecticut Power & Light Company, East Hampton, Conn., has purchased the Essex Light & Power Company of Essex, Conn., and will at once undertake the intensive commercial development of the territory covered by the latter organization, including industrial and residential loads of attractive prospects. Financing will be handled by Bodell & Company, Providence, R. I. The acquisition of the Essex company will increase at once the area and number of customers added to the Central Connecticut system by about 50 per cent, and the combined territories will extend from East Hartford to Long Island Sound. Franklin N. Fernald is vice-president and general manager of the Central Connecticut company.

St. Louis River to Be Developed

Completion of arrangements for the purchase from the Weyerhauser interests of Cloquet, Minn., of additional power properties on the St. Louis River by the American Power & Light Company, which recently acquired the Great Northern Power and the Minnesota Utilities companies, has been announced by W. S. Robertson of the Phoenix Utilities Company, who is in charge of developments in the Duluth district for the American Power & Light Company.

The purchase is part of a project to develop the entire resources of the St. Louis River system into one power-producing and distributing organization. Construction work now under way at Fond du Lac, Wis., will increase the present power capacity of the river from 80,000 hp. to 95,000 hp. within a year, according to Mr. Robertson.

Engineers have estimated that complete development of the system will make possible a total of 130,000 hp. All of this eventually will be made available to Duluth and vicinity, including the Iron Ranges, it is planned.

At the same time, arrangements were made for the acquisition of the power transmission system known as the General Light & Power Company, which serves Cloquet and towns north and south as far as Floodwood and Sandstone. This system will be tied in with the system of the Great Northern Power Company and the Minnesota Utilities Company.

Inductive Trouble on Coast

California Commission Calls Conference on Postal Telegraph Complaint Against Pacific Gas

AS THE result of a complaint filed against the Pacific Gas & Electric Company by the Postal Telegraph Company, which claims that because of the proximity of the power lines of the electric company to its telegraph lines between Sacramento and Suisun the transmission of messages is interfered with, speed of sending messages reduced and its equipment and apparatus destroyed, the California Railroad Commission has called a conference for Aug. 31 of certain state utilities for the purpose of planning for the relocation of the wires which have caused the trouble.

Between Sacramento and Suisun the Pacific Gas & Electric Company has two 60,000-volt transmission lines which parallel the communication circuit of the Postal Telegraph-Cable Company. For a distance of approximately 12 miles the horizontal separation between the power and communication circuits is approximately 25 ft. In order that it might have a complete record of the scope and effect of the inductive interference, the commission has required, over a period of three years, the Postal company to file a record of all cases of interruption to its service and other cases where damage has resulted to its plant. The commission has also required the Pacific company to file reports regarding the cause of interference or abnormal conditions on power lines.

Although the Postal Telegraph-Cable Company is the only communication company involved in this particular proceeding, the Western Union Telegraph Company and the Pacific Telephone & Telegraph Company have circuits in this parallel. Accordingly, the order of the commission provides for a joint conference of all of the utilities operating either power or communication circuits within this particular section.

Better Inspection Urged for New York City

An increase of $250,000 annually in the city budget for a larger squad of more competent electrical inspectors for the Department of Water Supply, Gas and Electricity is being urged by Charles L. Eidlitz, on behalf of the Electrical Board of Trade of Greater New York, of whose board of governors he is chairman. At present there are fifty-seven such inspectors, receiving $1,200 a year each, which Mr. Eidlitz says is decidedly insufficient for experienced men.

He recommended further that hospitals, theaters, motion-picture houses and meeting places be inspected at an early date for fire hazard due to a possibility of defective wiring. While not wishing to create undue alarm, Mr. Eidlitz says, the vast amount of new construction, and more particularly the widespread remodeling of buildings, calls for close supervision by experts of all electrical work done.

"Doing away with the power of the city to issue permits for $1 to any one wishing to have work inspected would stop 50 per cent of defective installations," Mr. Eidlitz asserts. "Where a building has no current, it is possible to work on the premises without a permit at all.

"The Electrical Board of Trade is desirous of having repair work and installing done on a uniform basis throughout the city, only by competent men who have passed technical examinations, the work later to be inspected by high-grade and well-paid men from the city bureau. Under the present system, any wiring poorly done may bring a $50 fine when discovered. A policy of safety first would prevent the unsatisfactory work from being done at all."

Mr. Eidlitz is contemplating placing the matter before Commissioner W. J. Hayes, submitting, along with the suggestions of the electrical group, recommendations along similar lines made by leading contractors and by the Board of Fire Underwriters.

September Meeting of the Great Lakes Division

Future distribution voltage and the trend of steam power-plant design will be some of the topics to be presented at the third annual convention of the Great Lakes Division of the N.E.L.A., to be held in joint meeting with the fifteenth annual convention of the Indiana Electric Light Association at the French Lick Springs Hotel, French Lick, Ind., from Sept. 26 to 29. Although the complete program will not be available before Sept. 1, the subjects up for discussion will include:

Paper, "Mechanical Refrigeration."
Paper, "The Future Distribution Voltage as It Affects Central-Station Companies."
Paper, "The Trend of Steam Power-Plant Design."
Paper, "Practical Methods of Improving Contacts with the Public."
Paper, "Bookkeeping Machines in Connection with Light and Power Customers' Accounts."
Symposium, "How the Industry Can Help Itself." Public Utility Information Committees: Speakers—Illinois, B. J. Mullaney; Wisconsin, Franz Herwig; Michigan, Alfred Fischer; Indiana, John C. Mellett.
"N. E. L. A. Sections' Work Planned for the Administrative Year": Accounting Section, W. A. Jones, chairman; Commercial Section, N. T. Wilcox, chairman; Public Relations Section, H. T. Sands, chairman; Technical Section, H. P. Liversidge, chairman.
Address, "Supplying Rural Districts with Electricity," by a representative of the American Farm Bureau Federation.
Address, "What I Have Derived from the Advanced Accounting Course."

Address. Invitations have been extended to several members of public utilities commissions in the division to address the convention.

An usual, a special one and one-half fare for the round trip from all states in the Central Passenger Association territory is again available. Identification certificates may be obtained from R. V. Prather, Thomas Donahue, Herbert Silvester, and John N. Cadby.

Final Program of National Electrical Credit Men

For the "Silver Jubilee" meeting at the Copley-Plaza Hotel, Boston, on Thursday and Friday of next week of the National Electrical Credit Association, which this year is celebrating its twenty-fifth anniversary, this program has been prepared:

THURSDAY, AUGUST 9, 9:30 A.M.

Address of welcome, Mayor J. M. Curley; response, Albert H. Elliot, secretary Pacific Coast Association; reports and announcements; "Review of the Beginnings of the N. E. C. A.," Charles M. Wilkins; "Relation of Credit to Capital Investment," E. W. Shepard, Western Electric Company, discussion led by Joseph C. Belden; address by Paul Hollister, Boston; memorial addresses for deceased presidents: Frank Ridlon, by a Boston member; James Wolff, by Frank M. Pierce, Chicago; John Forman, by C. M. Wilkins, Toronto; John H. Dale, by Robert Edwards, Jr., New York City.

FRIDAY, AUGUST 10, 9:30 A.M.

"How New Lines of Merchandise, Such as Radio, Affect Credit," A. F. Hearl, American Electric Supply Company, Chicago, discussion led by George J. Murphy; "Mercantile Agency Reports—How They Can Be Improved by Merchants' Co-operation," J. S. Thomas, Elliott-Lewis Company, Philadelphia, discussion led by H. D. Clark; address by W. T. G. Harding, governor Federal Reserve Bank, Boston; general discussion of association problems.

On Thursday evening the "Silver Jubilee" banquet will be held, when Governor Cox of Massachusetts and George S. Smith, vice-president of the New England Power Company, will be the principal speakers. Frederick P. Vose, secretary of the association, will be the toastmaster. In the afternoons of Thursday and Friday there will be golf tournaments, sightseeing tours and boat rides, and a "Silver Jubilee" outing on Friday evening to Nantasket Beach will conclude with a sail around Boston Harbor.

Hydro-Electric Development in Brazil

The steady progress of hydro-electric power development in Brazil is reflected in a series of contracts lately undertaken or completed by the Pelton Water Wheel Company, Atlantic Department, for plants in that country. One of the most interesting of these was for two 4,000-hp. units for the new Fagundes power plant of the Cia Braziliera de Energia Electrica, near Rio Janeiro. The installation included turbines, auxiliaries, power-house equipment and penstocks.

These turbines are of the single-discharge, horizontal, reaction type and will operate under an effective head of 365 ft. The design, which was developed throughout by the Pelton company, is known as the single overhung type, as only two bearings support the entire weight of rotating elements of both turbine and generator, all on one shaft. The turbine runner is on one end of the shaft, the direct-connected exciter on the other; the bearings are inside these two, and the generator is between them. This makes, naturally, a compact, simple and efficient design.

Another interesting Brazilian contract recently given the Pelton company will supply power for a new textile mill

project near Pernambuco. This consists of two 400-hp. impulse wheels, to operate under about 360 ft. head, directly connected to General Electric alternators. Current will be generated at 6,600 volts and transmitted over a 4-mile line to the textile mill. The design required unusually sensitive governors, as the maximum speed variation allowable for an ordinary change in load is 5 per cent. This requirement was successfully met by the Pelton design. It was also necessary in both the hydraulic and electric features to make the entire equipment as near "foolproof" as possible, because of the scarcity of skilled labor and the difficulty of getting spare parts or making repairs. The result is that, by a number of devices, control of the entire plant is centralized at the switchboard to a much greater extent than would be necessary in a similar plant in the United States.

The turbines and auxiliaries will be built in the I. P. Morris Department shops of the William Cramp & Sons' Ship & Engine Building Company at Philadelphia, the Pelton company being one of the units of the Cramp organization.

Electrification in Prussia

Three laws authorizing the state to subsidize the electrification of the district along the middle and lower Weser and to acquire an interest in two industrial enterprises operating electric power stations were passed by the Prussian Diet not long ago, according to a report received by the Department of Commerce from William Coffin, American Consul-General at Berlin. The terms of the laws are:

1. The state is authorized to spend 26,000,000,000 marks to electrify the region along the middle and lower Weser, to guarantee to the extent of 26,000,000,000 marks any loans issued by a corporation operating this enterprise, and to disburse 11,400,000,000 marks toward laying state-owned cables and constructing plants which will connect the high-power station at Hanover with the state-owned cables in the region of the upper Weser.

2. The state is authorized to acquire an interest in the Ostpreussenwerk A. G., an electric power station, by the purchase of shares to the extent of 200,000,000 marks, on the understanding that the capital stock shall be increased to 600,000,000 marks; in addition, to grant the enterprise a non-recallable loan of 750,000,000 marks, to hold at its disposal another 4,250,000,000 marks, and to guarantee, in conjunction with the Reich and the Province of East Prussia, a further issue of 30,000,000,000 marks in bonds.

3. The state is authorized to acquire, to the extent of 250,000,000 marks, an interest in the A. G. Ueberlandwerk Oberschlesien, an electric power station the establishment of which is under consideration, and to undertake to guarantee to the extent of 1,000,000,000 marks any loans issued by the undertaking.

Brief News Notes

South Dakota Plant Sold.—The Union Light & Power Company of Omaha, Neb., has formally taken over the ownership and control of the Boyle Electric Company plant in Clark, S. D. The Omaha company is said to have been striving for some time to secure entrance into Clark. The plant was first offered for sale to the city but the citizens of Clark at a special election decided against purchasing it.

Another Aluminum Cable Line.—A 30-mile, 34,600-volt, seven-strand aluminum cable transmission line is being built by the British Columbia Electric Railway Company to supply power to the Britannia Mining & Smelting Company. The line extends from West Vancouver to Britannia Beach. The highest altitude reached by the line will be 1,400 ft., although the ends will be at sea level.

Injunction Against Development of Klamath Water Power Denied.—Injunction proceedings seeking to prevent the Federal Power Commission from leasing and developing the water power of the Klamath National Forest Reserve in California and Oregon have been dismissed in the District of Columbia Supreme Court. The petition for an injunction was filed on behalf of the Karok or Peh-Tsick Indians, inhabitants of the reserve.

Indiana Commission Starts State-Wide Investigations. — Searching investigation into the affairs of seventy public utilities of Indiana has been ordered by the Public Service Commission, making a total of eighty-five plants now under its scrutiny. Of the seventy additional companies, thirty-eight are privately owned corporations and thirty-two are municipal utility plants. The list includes fifty-three electric companies and two plants providing both water and electric service.

The Isar Works in Bavaria.—One of the largest engineering plants in the world is, a European correspondent of the ELECTRICAL WORLD writes, nearing its completion in Bavaria. The River Isar has received an entirely new bed for a length of 55 km., from Munich to Moosburg. Four generating stations have been built along the new riverbed, which have an annual output of more than 480,000,000 kw.-hr., thus saving no less than 500,000 tons of coal per annum. The Finsing power station will supply 63,000,000 kw.-hr. of electrical energy per annum, and eight turbines and two generators have been installed at that station. At the Aufkirchen power station four turbines will furnish more than 150,000,000 kw.-hr. a year, and at the Etting station four turbines will supply 144,000,000 kw.-hr. At the fourth power station, at Pfrombach, four turbines will furnish 119,000,000 kw.-hr.

Hagerstown's Modern Switching Station.—The Potomac Public Service Company of Hagerstown, Md., which serves Hagerstown, Frederick and other places in Maryland, besides controlling and operating utilities in Winchester, Va., Martinsburg, W. Va., and Chambersburg, Pa., is constructing a "superpower" plant at Williamsport, Md., on the Potomac River, which, when completed, will bring the rating of the company's plants, previously numbered at four steam and four hydro-electric, to approximately 60,000 hp. To give Hagerstown the full benefit of the increased energy soon to be available the company is constructing there a thoroughly modern centralization and switching station, which, the company asserts, will make Hagerstown one of the best served cities in the country.

Buffalo Convention Hall Power Equipment.—Karr Parker, engineering manager of McCarthy Brothers & Ford, Buffalo, announces that his firm is completing the installation of electrical power equipment and facilities in the Broadway Auditorium that will make it the best equipped convention hall in the country from this standpoint. The contract involves a complete system of heavy power wiring with numerous special floor boxes for all kinds of current, with complete switchboard equipment for the Buffalo General Electric Company's high-tension service. The equipment will include a 200-kw. synchronous motor-generator set to supply, besides direct current, 60-cycle, three-phase and single-phase, and 25-cycle, three-phase, 220-volt service. One of the first conventions to use this equipment will be that of the Association of Iron and Steel Electrical Engineers on Sept. 24 to 28. An electrical blast furnace and rolling mill will actually produce steel during this convention.

Los Angeles Improving Its Lighting System.—Extensions to its lighting system now under construction and others for which contracts will be let in a short time will make Los Angeles the best lighted city in the West, according to the city officials who have the matter in hand. The largest contract for ornamental lighting, in Western Avenue between First Street and Los Feliz Boulevard, is nearing completion. This system will connect with the system already installed in Western Avenue between First Street and Wilshire Boulevard. A similar system is being installed in Vermont Avenue from Los Feliz Boulevard to Hollywood Boulevard. An ornamental lighting system in Hollywood Boulevard between Vermont Avenue and Vine Street is to follow and will connect with the lighting system in Hollywood Boulevard between Vermont Avenue and Sanborn Junction. The ornamental system in Washington Street from Main Street to Vermont Avenue is nearing completion, and it is planned to continue this system westwardly to Eighth Avenue.

New Plant Projected for Rome, N. Y.—The Manufacturers' Power Corporation of Rome, N. Y., incorporated for generating electricity and serving the Rome Wire Company, the Rome Brass & Copper Company and the Rome Manufacturing Company, has submitted evidence to Public Service Commissioner Van Voorhis in support of its petition for permission to construct a steam-generating electric plant in Rome and to exercise a city franchise.

Largest Dry Dock to Be Operated by Electricity.—The largest floating dry dock in the world, capable of handling the Leviathan or even greater ships, is under construction at Southampton, England. The dry dock, which will be 960 ft. long and 134 ft. wide, with a lifting capacity of 60,000 tons, will be operated entirely by electricity from a central station ashore. Fourteen electric pumps will eject 80,000 tons of water, the maximum needed to empty the basin, in four hours. Electrical air compressors will drive the pneumatic machinery, electrical capstans will haul in the giant cables to make the ships fast, and electrical traveling cranes will fetch and carry for their repair.

Penn Public Service Asks Permission to Purchase Northwestern Company.—The Penn Public Service Company has asked the Public Service Commission of Pennsylvania to approve its purchase of the Northwestern Electric Service Company of Erie as a link in its plan for extending its power system over a large portion of the state. The Northwestern company serves communities for a distance of more than 50 miles, operating a trolley line from Meadville to Erie, which will be included in the purchase. It will be operated in connection with the Clarion River power plants now in the course of construction and its purchase will be a logical sequence of the acquisition by the Penn Public Service Company of the Erie Lighting Company, the Warren Light & Power Company and the Du Bois Electric & Traction Company.

Huntington Gets More Power.—In order to meet the growing demand for electric power and service of the manufacturing industries in and about Huntington, W. Va., the Consolidated Power & Light Company is building a new 20,000-hp. unit at the Kenova generating station. Recently $1,500,000 in 7 per cent cumulative preferred stock was sold to finance this new plant. The system now owns and operates a modern power plant at Kenova, W. Va., which, upon completion of this new 20,000-hp. unit, will have a generating capacity of 40,000 hp., and with the power plants at Roanoke and Lynchburg, Va., the company will have a total generating capacity of 60,000 hp., of which 6,800 hp. is hydro-electric. The company recently closed a contract at Huntington with the Virginian Power Company for the purchase of additional power on favorable terms, and at Roanoke a satisfactory power purchase contract exists with the Appalachian Power Company.

High Prices Postpone Construction.—Construction of the new $3,000,000 power plant of the Sioux City Gas & Electric Company, which was planned to be started this year and completed for operation during 1924, has been indefinitely postponed, owing to the high prices on material and equipment, and because of the engineers being unable to decide on a suitable site, according to William J. Bertke, general manager of the company. In the meantime several thousands of dollars is being spent in repairs on the old plant pending the construction of the new one, Mr. Bertke explains. Company engineers also are continuing their prospecting for the best possible location for the new plant.

Korean Emperor's 60-Cycle Rotary Converter.—The photograph, taken a short time ago, shows one of the first 60-cycle rotary converters made. It was installed in Seoul, Korea, more

than twenty years ago when the Emperor of that country ordered the city equipped with electric street cars. The converter has a capacity of 120 kw., 550 volts, and both the motor and the exciter are belted. It is in daily operation and is reported to be giving first-class service in every way.

Power Possibilities of Winnipeg River.—Engineering investigations conducted by the Canadian Interior Department have proved the Winnipeg River to rank high among the power rivers on the North American Continent. Its maximum recorded flood is but six times its minimum flow, and in any one year the ratio between highest and lowest flow is very much less. The river traverses but 100 miles between the Manitoba boundary and Lake Winnipeg, and in this short distance there are nine feasible power sites varying in capacity and attractiveness, but all, it is predicted, certain to be developed within twenty-five years. Three of these sites, with a total ultimate capacity of 200,000 continuous horsepower, justifying a commercial installation of 300,000 hp., have already been developed, one by the city of Winnipeg and two by the Winnipeg Electric Railway Company. Plans are now being prepared for a fourth and fifth development.

Associations and Societies

Pennsylvania Electric Association.—This association will hold its annual convention at Bedford Springs, Pa., on Sept. 5-8. The association is the Eastern Geographic Division of the N.E.L.A.

Empire State Gas and Electric Association.—The annual meeting of this association is announced for Oct. 8 and 9 at the Lake Placid Club, Lake Placid, N. Y. The program will deal with matters of particular interest to the executive officers of member companies.

San Francisco Electrical Development League—James R. Strong, president of the Association of Electragists International, was the speaker of the day at the July 23 meeting of the San Francisco Electrical Development League. In his talk Mr. Strong dealt with the advantages of associations and said that vital business facts were being less jealously guarded at the present time, drawing the conclusion that associations were partly responsible for this.

S. E. D. Calls Conference of Local Leagues.—Camp Co-operation III will be held under the auspices of the Society for Electrical Development at Association Island from Sept. 16 to 19. This is the second conference of electrical leagues and groups interested in forming local co-operative organizations. It is hoped to have a good attendance from all sections in order to bring out all viewpoints in the discussion of important questions.

Coming Meetings of Electrical and Other Technical Societies

[A complete directory of electrical associations is published in the first issue of each volume. See July 7 issue, page 56, for latest list.]

National Electrical Credit Association—Boston, Aug. 9-10. F. P. Vose, 1347 Marquette Bldg., Chicago.

New England Division, N. E. L. A.—Swampscott, Mass., Sept. 5-8. Miss O. A. Bursiel, 149 Tremont St., Boston.

Conference of Electrical Leagues.—Association Island, Sept. 16-19. Society for Electrical Development, 522 Fifth Ave., New York.

Rocky Mountain Division, N. E. L. A.—Glenwood Springs, Col., Sept. 17-19. O. A. Weller, 900 15th St., Denver.

Association of Edison Illuminating Companies—Dixville Notch, N. H., Sept. 17-21. P. S. Millar, 84th St. and East End Ave., New York.

Michigan Electric Light Association—Grand Rapids, Sept. 18-20. Herbert Silvester, Detroit Edison Co., Ann Arbor.

Illuminating Engineering Society—Lake George, N. Y., Sept. 24-28. S. G. Hibben, 29 West 39th St., New York.

Association of Iron and Steel Electrical Engineers—Buffalo, Sept. 24-28. J. F. Kelly, 513 Empire Bldg., Pittsburgh.

Indiana Electric Light Association—French Lick Springs, Sept. 26-29. T. Donahue, Northern Indiana Gas & Electric Co., Lafayette, Ind.

American Electrochemical Society—Dayton, Ohio, Sept. 27-29. Colin G. Fink, Columbia University, New York.

American Institute of Electrical Engineers—Pacific Coast convention, Del Monte, Cal., Oct. 2-5. F. L. Hutchinson, 33 West 39th St., New York.

Association of Electragists International—Washington, Oct. 8-13. Farquson Johnson, 15 West 37th St., New York.

Commission Rulings

Advantages of Adjusted Rates.—In condemning the practice of applying straight rates to gas consumption regardless of the amount consumed the Kansas Public Utilities Commission said recently: "The electrical business is one of the most progressive and most rapidly developing businesses in the whole country. One reason for its success has been the carefully adjusted system used, with the approval of the regulatory commissions, by most of the larger electric light and power companies. They have had schedules of charges fitted to the needs of the different classes of customers and as a result have undertaken intelligently to supply the various classes of their demand. No electric plant of any size, whether privately or municipally owned, has been operated upon the basis of a straight consumption charge of all customers regardless of the amount of their demand. The commission is of the opinion that ultimately the straight rate based wholly upon consumption must be abandoned."

An Explanation of Depreciation.—In sustaining the present rates of the Appalachian Power Company against complaints filed by coal companies, the West Virginia Public Service Commission made these observations on depreciation: "In ascertaining the value of a utility for rate-making purposes by the 'investment-cost' method depreciation does not apply in the same manner as it does in ascertaining the value by the 'reproduction-new-cost' method. If investors skillfully and judiciously locate and construct a plant, operate it economically and maintain it efficiently, they are entitled to have their investment kept intact and undiminished by wear, deterioration or obsolescence unless the amount that the investment may have been diminished has been returned to the investors. . . . If all the units of the plant were of comparatively small cost, the investment could be kept intact and protected by a reasonable annual maintenance expense. Defendant's plant consists of many large and expensive units. When these large units have to be replaced, by reason of wear and deterioration or by reason of obsolescence, the expense of such replacements will be too great to be met by a reasonable annual operating expense. The active life and use of these large units are being consumed by the present patrons of the utility. It is the duty of these patrons to contribute to the defendant company a sufficient amount of revenue to pay operating expense and taxes, to maintain efficiently said plant, to provide a reasonable return upon the present fair value of the plant and to create a fund out of which said large units may be replaced so that the value or corpus of the plant of the investors will not be reduced. If a plant is highly maintained, the amount set aside each year for the reserve fund need not be so large as the amount would be if the plant were not so efficiently maintained. This reserve fund is sometimes designated as a depreciation reserve fund or a retirement fund and often designated as 'depreciation.' This fund is usually created by applying a certain per cent to the rate base of the utility. . . . This fund should be kept under a separate account and the annual contribution to the fund should be invested by the utility so that it would earn a reasonable income each year and the income should be charged to the account so that the account would be accumulative and would be sufficient at all times to meet the necessary replacement charges. This fund should not increase or diminish the rate base of the utility unless the fund or part of it be returned to the investors, and in such case the rate base should be reduced to the extent of the funds returned to the investors."

Recent Court Decisions

Inadequate Voluntary Rates on Different Basis from Inadequate Rates Imposed by Commission.—A situation where the state reduces the former rates of a utility and imposes a new rate upon it pending the completion of its rate-making process is entirely different from that presented in a case where the existing rates claimed by the company to be confiscatory have not been imposed upon it by any act of the commission but have been voluntarily established by the company itself with the approval of the commission, according to a decision of the United States District Court in Cumberland (Tenn.) Telephone & Telegraph Company vs. Railroad and Public Utilities Commission. The court said: "I am of the opinion that where the utility seeks an increase in existing rates that it has itself voluntarily established the state may properly provide for the suspension of such increased rates and the incidental maintenance of the existing rates pending a reasonable time allowed for investigation by the commission as to the reasonableness of the proposed increase, such preservation of the status quo established by the utility itself being merely an incident to the proper exercise by the state, through its commission, of the rate-making process; and that where such delay is not unreasonable, the utility is not entitled, on the ground that the existing rates which it has thus established are confiscatory, to be granted an injunction the effect of which would permit it to increase the rates thus voluntarily established pending the due and proper exercise of the rate-making process." (287 Fed. 406.)*

Tennessee Commission Is Not a Court.—Examining a claim made by the Cumberland Power Company, in appealing against a decision of the Tennessee Railroad and Public Utilities Commission disapproving a contract between the utility company and the city of Lebanon, to the effect that the commission is a judicial body and that hence its decisions can be appealed to the Supreme Court of the state, which has appellate jurisdiction only, that court denied the contention, asserting that a tribunal exercising, as does the commission, commingled legislative, executive and judicial functions cannot be made a court. Hence its actions are not subject to review by the Supreme Court, and the provision of the law providing for appeal to that court is unconstitutional. (249 S. W. 818.)

Nature and Extent of Flowage Rights.—In Glidden vs. Beaverton Power Company the plaintiff sought damages for the flooding of his land caused by the defendant company's dam. The power company claimed flowage rights acquired from the predecessors of both parties in the chain of title. Sustaining a verdict for the defendant, the Supreme Court of Michigan held that the right of flowage or to dam water back above its natural level is in its nature an easement which an owner of full title can reserve when disposing of the fee, or he may retain the fee and deed the right of flowage to others as a perpetual easement. An omission by the riparian owner to make use of such right does not impair his title or confer any right thereto upon another, although the adverse enjoyment of it by another for the prescriptive period may. (193 N. W. 862.)

Admissible Evidence Concerning Ownership of Wire.—Several demurrers taken in Bloom vs. Union Electric Light & Power Company by the defendant, which was held responsible for injury to plaintiff by a falling wire in a public thoroughfare, were overruled by the St. Louis Court of Appeals. The court held that the testimony of a witness who had charge of city-owned wires that none of these was broken and that an open circuit was always made manifest in the office was, although partly based on hearsay, properly admitted as tending to show the company's ownership of the wire, and that this question of ownership was properly submitted to the jury, no evidence having been offered to show that the company did not own the wire. This, the court held, could, if true, have easily been proved by the company's records and the testimony of those of its employees who were on the ground soon after the accident. Direct proof of the company's negligence was unecessary in a case where the doctrine of *res ipsa loquitur* (the thing speaks for itself) was applicable. (251 S. W. 411.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men
Engaged in all Branches of the Electrical Industry

Charles O'B. Murphy Resigns

Charles O'Brien Murphy resigned from the offices of vice-president and general manager of the Merchants' Heat & Light Company, Indianapolis, and from the same offices in all the Brewer utility companies in Indiana on Aug. 1. In announcing his resignation Mr. Murphy said his reasons were purely personal and that his relations with the Brewer companies and their managements had been very pleasant. He plans to spend a short time in resting from the arduous work of the last few years in organizing and merging utility companies in Indiana for the Brewer interests.

These interests have been for several months engaged in merging smaller electric utilities into a few large corporations. Originally the plan was to have one large company, the Indiana Electric Corporation. When the city of Indianapolis and other city governments affected by the proposed merger opposed the plan and appealed to the courts, after the Public Service Commission had approved the plan, the merger scheme was changed somewhat, and several of the companies have been merged into two or three new organizations. The Indiana Electric Corporation plan eventually was sustained by the courts, and the corporation is proceeding with the erection of the power plant on the Wabash River in Vigo County.

Besides being the vice-president and general manager of the Merchants' Heat & Light Company and hence the local operating head of the company, Mr. Murphy has held the same office in the Central Indiana Power Company, the holding company of the Brewer Indiana utilities, and in addition has been the vice-president and general manager of the Indiana Electric Corporation, the Wabash Valley Electric Company, the Northern Indiana Power Company, the Putnam Electric Company and the Cayuga Electric Company. A detailed account of his early career appeared in the April 7 issue of the ELECTRICAL WORLD. His successor has not been selected.

Prof. Royal D. Sloan, who has served as assistant professor of electrical engineering at Yale University during the past year, has been appointed associate professor of electrical engineering at the State College of Washington at Pullman. Professor Sloan is a graduate of the University of Montana and was employed two years with the General Electric Company and later with the Montana Power Company on the Thompson Falls development. During the war he entered the service of the navy and was in charge of the electrical equipment of the battleship New Mexico with the rank of junior lieutenant. Before going to Yale Professor Sloan had been associate professor of electrical engineering at the Montana State College for a number of years.

Owen D. Young, chairman of the board of directors of the Radio Corporation of America and of the General Electric Company, who sailed for Europe on the Paris about a month ago to attend the meeting of the Consortium of International Radio Corporations, returned to this country on Wednesday, Aug. 1, on the White Star liner Majestic.

N. H. Coit has resigned his position as superintendent of the Auburn plant of the Western Public Service Company, Auburn, Neb., to assume the duties of assistant to H. G. Harvey, commercial manager of the Pennsylvania Edison Company, Easton, Pa. The Edison company is one of the important links in the Pennsylvania-New Jersey power system controlled and operated by the W. S. Barstow Management Association, Inc.

W. A. Kitchen of the electrical engineering department of the Oklahoma Gas & Electric Company has recently been placed in charge of all electrical engineering matters pertaining to transmission and distribution. Three years ago Mr. Kitchen became associated with the company at Oklahoma City and subsequently was transferred to Sapulpa as chief dispatcher. Later he returned to Oklahoma City in the electrical engineering department.

Lincoln E. McRae, field manager of the securities department of the Central Maine Power Company, Augusta, Me., has been appointed sales manager of that department, succeeding A. S. Brown, who has resigned to become associated with Percy H. Whiting. Mr. Whiting recently severed his connection with the Central Maine Power Company to head the customer-ownership division of the securities department of Henry L. Doherty & Company, New York. James H. Record has been appointed field manager to succeed Mr. McRae.

J. H. Crossley of the Metropolitan-Vickers Electrical Company, Manchester, England, was lately in the United States studying industrial electric heating developments for the purpose of promoting that application of electricity in England, where it is employed less extensively than in this country. After electrifying a number of producer-gas ovens in the main plant of the Metropolitan-Vickers Company, to be used for demonstration and test purposes as well as for the regular manufacturing processes of the company, he will deliver lectures on the advantages of electrical heating in the various industrial centers of England. Mr. Crossley was sent to this country in 1921 by the Metropolitan-Vickers company to make a number of special investigations. In January, 1923, he was instructed to begin an intensive study of electric heating, and he spent four months investigating the methods of manufacture of industrial heating apparatus in the shops of the Westinghouse company and the methods of operation of this apparatus in factories in various parts of the country. Mr. Crossley sailed for England on July 13.

Obituary

Herbert S. Pope, president of the Barnes-Pope Electric Company, a Boston contractor-dealer house, died at Boston July 23 from a self-inflicted bullet wound. It is believed that despondency caused by ill health was the cause.

Harry T. Woodfill, general superintendent of the Greensburg (Ind.) Gas & Electric Company for the last twenty years, died recently at his home in that city. Mr. Woodfill, who was sixty years of age, had been in poor health for several years. He was born in Greensburg in 1863 and was educated in the city schools. For more than forty years he had been prominently identified with the business interests of his native city and at the time of his death was a director of the Greensburg National Bank.

John A. McCampbell, for the last eighteen years a member of the Stone & Webster organization, died recently. Mr. McCampbell, who was born in Knoxville, Tenn., in 1873, entered the employ of Pepper & Register, engineers and electric railway contractors at Philadelphia, in 1892, and remained with them until 1898. Then he became associated with the South Shore & Boston Street Railway and subsequently with the Massachusetts Electric Company as chief engineer of power stations at East Braintree and Quincy Point. In 1901 and 1902 he was chief engineer of power stations for the Houghton County Street Railway at Hancock, Mich., and was connected with several other utilities until he became identified with Stone & Webster on Dec. 1, 1906. He instituted betterment operation in power plants at Houston, Dallas, El Paso, Fort Worth, Key West, Jacksonville, Seattle and Bellingham and also supervised the installation of mechanical equipment in a large steam plant on the Niagara River which Stone & Webster were building for the Buffalo General Electric Company. After leaving Buffalo he became general superintendent on the construction of a 100,000-kw. plant for the Philadelphia Electric Company.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

The Jobber and the Contractor—A Problem—II

The Contractor's Value as a Customer—How Price Sirens Demoralize Him—His Strength in Specialized Functions—Breaking Faith With Trade

By W. R. Herstein
Vice-President Wesco Supply Company, Memphis, Tenn.

As I stated in the preceding paper, the result of my twenty years experience in selling the contractor leads me to believe that he is not only the jobber's legitimate customer, but that he is the jobber's golden opportunity. The great bulk of his purchases are made in quantities that afford the jobber a real profit. He does not become syndicated, consequently his defection in a quantity large enough to be harmful is not possible. His credit is frequently poor, but his number is so large that responsibility is spread over many units and individual losses are comparatively small. As a rule, he does his own buying, and efficient salesmanship brings better results, where service and quality count, than with professional purchasing agents. Finally, he is responsive to proper treatment, and a community of interest, once established, renders future relations easy to maintain and productive of exceptionally profitable business.

Present Weaknesses

As against these virtues which I am extolling, it must not be concealed that the contractor has characteristics which are not so admirable. The contractor's environment tends to make him suspicious, sullen and resentful. In any group of men, large or small, we will nearly always find at least one member who is willing to turn to his own profit a situation requiring the good faith of the entire number to make it work to the mutual advantage of the complete group. Hence we find that in a situation involving the co-operation of jobber and dealer, a single member of the latter class will sometimes take his own share of the benefits, but will not contribute his pro rata of effort or good faith in return.

Perhaps the most serious criticism of the contractor, however, may be leveled at his shortsighted cupidity, which frequently impels him to sacrifice his jobber friends and jeopardize a highly advantageous situation by yielding to small price concessions from suppliers who are uninterested in him except for the immediate moment, and entirely indifferent to his welfare, the solution of his problems and his continued success in business.

Another criticism of the contractor is his too frequent neglect of his credit standing in the industry. His habit of saddling his financial burden upon the jobber is notorious, though in justice it must be said that the jobber not infrequently invites and encourages this shortcoming. When the contractor finally learns that collecting is as important a feature of his business as buying and selling, relations between himself and his jobber become vastly more cordial.

I once heard a prominent physician remark that the tendency of his profession was toward self-destruction, because the efforts of its members to prevent disease would presently leave no patients to cure. The electrical jobber, in his relations with the contractor, stands in like case, to a considerable extent, in that so far as his effort to improve the contractor's condition is successful, just so far does he render the contractor independent of jobber connections. It is in many individual instances of this character that what I have just termed his "shortsighted cupidity" comes into full play.

The business of the successful contractor is eagerly sought, not only by legitimate jobbers, half-baked jobbers and manufacturers' agents, but by manufacturers themselves, and the contractor who has money in bank and adequate storage facilities sometimes forgets the jobbers who permitted and helped him to acquire these. Not all contractors are of this type, but it takes strong business morality to resist the temptation of a lower price, even for an inferior brand, and particularly to withstand the desire to obtain prestige by being able to announce that he "buys direct from the factory." Indeed, these instances have the effect of a boomerang upon the jobber when his customer decides to add small-scale jobbing to his contracting business. It is generally conceded in the industry, and loudly demanded by the contractor, that a jobber shall not be also a contractor, but we do not hear so much about the converse of the maximum, namely, that a contractor shall not also attempt to do a jobbing business, and it seems that the example of a contractor continuing to contract, and at the same time to expand into jobbing, is quite a fashionable paradox in his own circles.

Specialized Functions

There is but one answer to this, and I think that we jobbers as a class should insist upon it firmly, loudly and continuously. The answer is so old that it has become almost hackneyed by use, but the very fact of its age renders it the more respectable, and the fact of its long usage shows that it stands that test. What I have in mind is this: that the production, distribution and practical application of electrical materials, particularly wiring devices, have developed into specialized functions. The industry is so vast that there is ample opportunity for the participants in any one function to expand profitably their entire energies in their chosen specialty; that an attempt to encroach upon the function of another will not only lead to chaos in the industry,

but to financial disaster to the offender, by reason of his abandonment of the function in which he is a specialist, and his entrance upon a career in which he is but an amateur.

In plain English, we, as jobbers, should take our cue from the contractor himself, and, just as he has proclaimed that a jobber must not be a contractor, we should respond that neither must a contractor be a jobber. True, we have no very adequate means of enforcing this dictum, but public opinion and industry opinion is a powerful weapon, and opinion may sometimes be created or influenced by a very small body of men if they are actuated by a logical proposition and a singleness of purpose.

THE MATTER OF KEEPING FAITH

When the contractor places price above quality and service, he strikes at the foundations of the edifice upon which our industry is built. The very first stone in the foundation of this structure is good faith—faith not only in the manufacturer, the jobber, the dealer and the customer, but faith in competitors as well. If the contractor desires relief from vicious competition, so also does the jobber. If the contractor desires our help in solving his problems, we need his as well, and the way to help us does not lie along the lines of compelling us to sell goods below cost. It does not lie along the lines of destroying faith in our own competitors by making misleading statements and false claims to our salesmen. It does not lie in compelling us to abandon the function of service, which alone justifies our existence, and forcing us to seek business through the mediums of cheap prices and worthless material.

The very fact that an electrical contractor, through success, becomes a leader in his community and a power in the industry should, if he is a real man, impel him to use his opportunity in a constructive way, and he is not doing this when he plays our salesmen one against the other; when he plays manufacturer against jobber, and when, for his own selfish purposes, he contributes to the breaking up of the code of ethics which started him on the road to prosperity.

GOLDEN RULE APPLIED

Surely it should not be necessary to point out to such a man the fact that in endeavoring to induce a jobber to disregard a well-recognized market price he loses far more than he gains. He should realize that a jobber who is untrue to his manufacturer will also be untrue to his customer. A jobber who breaks faith with his competitors will hardly keep faith with his trade. A jobber who is confessedly crooked in one phase of a transaction is unsafe to trust in any other phase. If the contractor in question succeeds in securing what he is led to believe is a "cut price," what assurance has he that his competitor is not securing even lower prices from that very jobber?

It is said that to grazing animals the grass on the other side of the fence always looks greenest, but let's remember that we are men, not cattle, and that we know the fallacy of the belief. Being men, we know where our opportunity lies; we know the line of endeavor for which we are specially fitted by temperament or training; we know that whatever success may crown our own efforts will be multiplied in collaboration with others, and in seeking this collaboration we would do well to bear in mind always the admonition: "Whatsoever ye would that men should do to you, do ye so to them."

A Way to Qualify New Products*

Trial Installation Under Special Supervision Is Going to Meet the Complaint That the National Electrical Code Blocks New Products

BY DANA PIERCE
Chairman Electrical Committee, N. F. P. A.

THE National Electrical Code in its twenty-five to thirty years' history has been a progressive evolution, a development with many changes. As the industry grew, with new methods, new materials and new experience, these developments have found their places in the rules and regulations of the code. If one compares the early code with the present one simply as to number of pages, the size of the book itself indicates the increase in the subjects, methods and materials dealt with.

I think I am correct in stating that no other set of engineering standards in the world can equal the National Electrical Code in its long, widespread and general use and application. It is well to bear this in mind. The code has in fact been a registry of the developing industry, of American practice viewed from the standpoint of safety.

Code rules have not anticipated development or inventions. They have not dealt with possible but rather with actual conditions, recording how existing, known methods and materials should be employed. The National Electrical Code is not wholly based on abstract principles or theory, but quite as much upon practical experience. It therefore probably contains some inconsistencies, at least from the theorist's viewpoint. It can be correctly appreciated only by remembering its history, its purposes and the sources of its growth, but, think of it as one will its service has been very great.

WHO IT REPRESENTS

This is what the National Electrical Code is. Its faults are recognized by its friends as well as by its opponents, and a constant, determined effort is made to improve it by obtaining the best opinions from every available source.

The electrical committee of the National Protection Association, whose function it is to develop the code, is composed of experienced men, many of whom have long been associated with this work. It includes representatives not only of insurance interests but also of all the large electrical organizations. These latter are the American Institute of Electrical Engineers, American Electric Railway Association, National Electric Light Association, Associated Manufacturers of Electrical Supplies, Electric Power Club, Association of Electragists (the contractors' organization), Electrical Supply Jobbers' Association, Associated Edison Illuminating Companies and the Bureau of Standards of the federal government. The representatives of all these have for years taken an active part in the successive revisions of the code and are doing so still.

NEW PRODUCTS BLOCKED

I have said that the code rests on practice as well as upon theory. It has been said that under the code no

*Being a statement presented recently at a public hearing in New York before the sub-committee on new developments, N. F. P. A.

new development could be recognized or approved till it had been tried and no such new development could be tried until it had been approved. The electrical press has had complaints that the code thus operates to hold back development of new inventions and practice.

The committee on new developments, which has recently been established as a sub-committee of the electrical committee, is an attempt—or call it, if you choose, an experiment—on the part of the electrical committee to break this circle of "no use till it is approved and no approval till it is used." We are trying with the same conscientiousness that has made the code to deal fairly with this situation, to be fair to the newcomer who is eager to introduce a new product or method and fair to the older men and methods. We wish to meet reasonable development in the industry with reasonable code rules, to serve the electrical industry in an orderly manner.

A Method of Trial

The purpose of the public hearing recently held to discuss two new electrical materials recommended for trial installation under special supervision, and, indeed, the purpose of the committee on new developments itself is not to revise the National Electrical Code. Rather we are trying to give the man with a new idea a reasonable and safe chance to prove his case in actual practice. The committee on new developments affords a means for this, instead of sending him to beg from one inspection department, municipal or underwriters', to another for a local exception which will allow him and them to gain the needed experience by actual trial.

Which is the better method for the electrical industry, for the inspection departments and for the general public— an orderly consideration of a new product by this committee, leading to a recommendation for trial installations, or an uncontrolled haphazard campaign by the manufacturers for special dispensations by local authorities? We present in the spirit of this meeting the record and experience of our electrical committee in doing the safe, reasonable, decent thing by the electrical industry and the public, and on the occasion of this first hearing of this sort it was considered proper to state clearly the intent of the committee on new developments, the reasons for its creation and the sincerity of its purpose.

Business Conditions

A Survey of Important Developments in the Electrical Market Including Data on Production, the Sales Outlook, Credits, Exports, the Metals and Other Conditions Affecting Cost, Supply and Demand

DESPITE a seasonal recession in demand, business is again active in Eastern manufacturing and jobbing circles. Prices are unstable in the wiring-device field, and sockets and switches showed marked weakness Monday on quotations out of factory sources. In apparatus bids firm prices are reported, owing to the upward pressure of labor costs and a none too plentiful supply of steel.

Deliveries are lengthening on armored cable for parkway lighting service to ten or fifteen weeks on current quotations, with some prospect of further diminution of supply this fall. Rubber-covered wire in New York City was reduced 3 per cent Tuesday, July 31. Distributors are advising early placement of orders for this class of material against fall demands.

Motor sales are running well ahead of last year, although some reduction in current requirements has made itself felt recently. Rigid conduit is short in Boston in the 3-in. and 1¼-in. sizes. General business in the East is fairly good, with a dull money market, reasonably good credit situation and some curtailment in the textile industry. The telephone strike on the New England system, which did not include Connecticut, failed completely last week and was declared off. Operators with good records are being taken back as openings in the service permit, but with loss of seniority privileges broadly speaking.

Excellent Outlook for Motors; Trend to Individual Drives

SALES of electric motors are running far ahead of last year's record, according to leading American producers, although at present there is a reduced demand for this class of apparatus as compared with a few weeks ago. Plant facilities are measuring well up to requirements and some surplus capacity may be said to exist, taking the motor manufacturing industry as a whole. During the spring the demand in some quarters approximated 75 per cent above last year's figures. The motor price situation is firm at present, following a 5 per cent advance early last month. Leading makers emphasize the probable influence of the anticipated eight-hour day in the steel industry as a factor tending to hold motor prices firm or to stiffen them later, and labor costs continue high in motor factory work.

The market is most encouraging for individual-drive motors, and in electric railway shops and other establishments long inured to group driving there is a decided trend toward unit powering of tools which makes for increased sales of motor and control apparatus. In new laboratories as well as in mills electric drives are taken for granted by designers. Sales of motors for industrial tractor and truck service are improving.

Delinquent Electrical Accounts Were Fewer in June

ACCORDING to the June reports of the National Electrical Credit Association, the number of delinquent accounts for the five sections reporting recorded a slight drop over the report of May, 1923. For the Central Division there were twenty-eight fewer accounts in June than in May, although the average amount increased $3.80.

The New York territory reports a reduction of nine accounts with a lower value of $118 in June as compared with $156 in May, 1923. The Philadelphia territory in June had an average value of $108.28 as compared with $117.33 for May, 1923, although the number of accounts for this period jumped from 225 to 227. The Pacific Coast, which has been running very low in number of delinquent accounts, jumped from twenty in May, 1923, to fifty-two, increasing an average value of $145.70 to $266.80 during the same period. The complete report is as follows:

DELINQUENT ACCOUNTS IN JUNE

Branch and Month	Number of Delinquent Accounts Reported	Total Amount	Average Amount
Central Division:			
May, 1922	746	$84,048.53	$112.66
May, 1923	749	95,984.35	128.15
June, 1922	727	87,643.24	120.55
June, 1923	721	95,133.51	131.95
New York:			
May, 1922	440	58,401.00	133.00
May, 1923	437	68,228.00	156.00
June, 1922	479	69,303.00	145.00
June, 1923	428	50,758.00	118.00
Philadelphia:			
May, 1922	236	22,175.99	93.97
May, 1923	225	26,399.32	117.33
June, 1922	207	22,401.38	108.22
June, 1923	227	24,580.53	108.28
New England:			
May, 1922	108	7,908.93	63.97
May, 1923	29	3,464.08	119.45
June, 1922	81	10,152.24	126.57
June, 1923	29	2,325.95	80.20
Pacific Coast			
May, 1922	24	2,133.82	88.99
May, 1923	20	2,910.69	145.70
June, 1922	18	2,353.13	130.75
June, 1923	52	13,873.41	266.80

Porcelain Insulator Deliveries Running at Two to Five Months

AS A RESULT of the widespread electrical power developments, the porcelain insulator manufacturers are now operating under such heavy demand schedules that their deliveries are delayed from two to five months, depending upon the type of equipment.

The only reason to account for this situation seems to be the overwhelming increase in demand for insulators which had been occasioned by power expansions of the past year.

This is true because no shortage of raw materials seems to exist and the labor market is quiet, outside of the usual tendency for the men working in the kilns to seek outside employment during the summer. But on the whole this labor factor is not very serious since it is a customary occurrence every year. So the only evident solution seems to lie in trying to increase the production of a line of goods which by its own inherent characteristics cannot be materially hastened without serious results. This is so because the time for testing and ageing of insulators does not allow hurried work. Accordingly the larger insulator organizations are now planning for the construction of new kilns. But since most of these kilns will not be ready until the first of the year no relief seems to be offered during the fall months.

Most of the present deliveries are going to new installations rather than for replacements. Although various companies report different figures, the relative percentage of insulators sold for new installations as compared with those for old ones ranges between 50 and 70. As to the location of the most active business, manufacturers say that while buying has been following the power developments throughout the United States, the activity along both the Atlantic and the Pacific coast has been the most pronounced.

The present price situation is one which has remained stable since early spring. Indications are that it will remain so, since manufacturers will try to maintain prices by increasing production to the point where it will meet the price advances of raw materials and labor, rather than change insulator prices.

Cautious Buying Continues in Pacific Coast Territory

UNCERTAINTY of the future is shown in eautious buying in the Pacific Coast Territory. Prices have dropped after a month or so of uneasy equilibrium which followed the sharp advances of the earlier part of the year. Schedule socket material for both construction and retail trade has decreased about 15 per cent. Household material sales have improved and radio business has increased considerably because of interesting public events which have required better broadcasting. The standardization of radio equipment is pointed by the slower movement of parts and insulating material from which amateurs made up their sets. A feature of present contracting and dealer business is the activity of the large interior cities such as Sacramento, Stockton and Fresno. A total of 52 delinquent accounts were reported in June compared with 18 in June, 1922.

Chicago Business Slowing Up; Expect Lower Material Prices

THE spirit of caution which has been prevalent during the first part of the month has recently been intensified by the drop of commodity prices and the moderate recession in building activity. The jobbers, while not drawing a pessimistic conclusion from the present economic conditions, are foregoing possible profits in the interest of maintaining a stronger cash position. They are retrenching to a certain extent, curtailing purchases, expecting lower prices on raw materials. While this attitude is a trifle overdrawn, the weak condition of the stock market has caused a pessimistic viewpoint to be formed by some of those who assume that movements of stock in themselves portend movements of business. The present strengthening of the stock market, while not great, together with the relatively easy condition of the money market, should shortly remove this idea.

No important price announcements were made this week. Wiring devices were reduced 5 per cent, while the demand is slow. Conduit price is firm, with the stocks depleted. Pole-line hardware and high-tension equipment sales remain good, due to utility purchasing. The pole situation has not changed, nor are there indications that the present shortage will be relieved for some time to come. Appliance sales have picked up somewhat. Washing machines in particular are going well. The cool weather in this vicinity curtailed the sale of fans to some extent, resulting in cancellations to the manufacturers. Building activity declined this week, although for this section the month compares favorably with the same month last year.

June Electrical Exports Drop $1,597,185 from Year Ago

TOTAL exports of electrical machinery, apparatus and appurtenances for June were $5,678,267, a decrease of $1,597,185 from June, 1922, when the total amounted to $7,275,452. In May, 1923, total electrical exports amounted to $5,396,943. The accompanying figures are supplied by the Bureau of Foreign and Domestic Commerce:

ELECTRICAL EXPORTS FOR JUNE, 1923, COMPARED WITH CORRESPONDING PERIOD A YEAR AGO

Articles	Value June 1922	Value June 1923
Turbines	$238,545	$3,550
Generators:		
Direct-current:		
Under 500 kw.	52,925	79,420
500 kw. and over	19,005	85,018
Alternating current:		
Under 2,000 kva.	17,070	13,926
2,000 kva. and over	4,220	49,030
Accessories and parts for generators	385,584	31,449
Self-contained lighting outfits	31,138	76,164
Batteries:		
Primary	127,468	118,056
Storage	149,808	203,250
Transforming and converting apparatus:		
Transformers—		
Power	952,473	265,755
Other	60,760	119,242
Rectifiers, condensers, double-current and motor generators, dynamotors, synchronous and other converters	351,868	71,671
Transmission and distribution apparatus:		
Switchboard panels, except telephone	368,291	89,635
Switches and circuit breakers above 10 amp.	127,967	172,530
Fuse and fuse blocks	14,620	21,547
Meters and measuring instruments:		
Watt-hour and other measuring instruments	58,286	44,761
Volt, watt and ampere meters, and other recording, indicating and testing apparatus	84,194	66,034
Lightning arresters, choke coils, reactors and other protective devices	185,246	59,051
Motors, starters and controllers:		
Motors under 1 hp.	64,214	158,921
Stationary motors, 1 to 200 hp.	157,096	264,944
Stationary motors, over 200 hp.	99,268	50,563
Railway motors	.....	42,146
Electric locomotives:		
Railway	4,856	129,492
Mining and industrial	74,483	19,573
Other motors	52,678	26,882
Rheostats, controllers and other starting and controlling equipment	86,103	153,417
Accessories and parts for motors	122,249	98,093
Electrical-Appliances, etc:		
Electric fans	$93,742	$43,196
Electric lamps:		
Incandescent—		
Carbon-filament	1,494	4,771
Metal-filament	80,198	120,926
Other electric lamps	10,430	14,175
Flashlights	19,702	47,303
Searchlights and projectors	5,430	14,562
Motor-driven household devices	64,561	100,036
Domestic heating and cooking devices	36,186	115,031
Industrial electric furnaces and ovens	48,094	18,776
Therapeutic apparatus, X-ray machines, galvanic and faradic batteries, etc.	41,933	109,944
Signal and communication devices:		
Radio and wireless apparatus	547,364	223,589
Telegraph apparatus	18,468	28,500
Magneto telephones	*	12,678
Other telephones	420,940	20,170
Magneto switchboards	*	6,017
Other telephone switchboards	*	10,842
Railway signals, switches and attachments	54,735	36,045
Bells, buzzers, annunciators and alarms	5,819	9,405
Other electrical apparatus and appurtenances:		
Spark plugs, magnetos and other ignition apparatus	102,765	181,850
Insulating material	70,413	113,656
Metal conduit, outlet and switch boxes	26,912	27,085
Sockets, receptacles and lighting switches	42,027	123,869
Other wiring supplies and fixtures	119,848	165,371
Other electrical apparatus	753,643	613,208
Globes and shades for lighting fixtures	39,491	38,332
Electrical glassware, except for lighting	7,775	12,087
Electrical porcelain	163,712	164,920
Electrical carbons, carbon brushes and electrodes	116,421	196,494
Insulated wire and cable (iron or steel)	42,768	47,365
Other manufactures of aluminum	140,031	94,261
Copper:		
Bare wire	162,161	174,411
Insulated wire and cable	147,974	275,272
Total electrical machinery, apparatus and appurtenances	$7,275,452	$5,678,267

*Not separately stated prior to Jan. 1, 1923.

New England Collections Running at Fair Rate

IN RESPONSE to careful supervision of accounts, New England collections in jobbing circles appear to be maintaining their earlier good record of the year. Money is plentiful and relatively easy, and the volume of business is so much above that of a year ago that underlying conditions are favorable to continued prosperity in well-conducted establishments rendering first-class service to the industry.

Railroad earnings are much improved, and collections from these and from electric utilities appear to be highly satisfactory. Industrial plant conditions are more uneven, the cotton textile mills having rather spotty business. The building industry is very active in comparison with most recent years, and while some difficulties are apparent in contractor-dealer accounts, jobbers are not giving evidence of any marked anxiety. Relations with the banks are apparently excellent.

The Metal Market

FEW sales of importance were made in last week's metal market. Electrical manufacturers continued to take even but medium lots of lead and copper at the level of 14.62½ cents, but hardly touched the small lots, which sold at 14.75 cents.

NEW YORK METAL MARKET PRICES

	July 24, 1923 Cents per Pound	Aug. 1, 1923 Cents per Pound
Copper, electrolytic	14.75	14.62½ to 14.75
Lead, Am.S.& R.price	6.00	6.25
Antimony	6.75	7.00 to 7.25
Nickel, ingot	27.00 to 32.00	27.00 to 32.00
Zinc, spot	6.10	6.10
Tin, Straits	38.08	39.00
Aluminum, 98 to 99 per cent	26.00 to 27.00	26.00 to 27.00

No action in the lead market was seen last week, although there was a fair demand from the dealers. The large producers were not anxious sellers and in no mood to sell to other than their regular customers. The orders, although numerous, were mostly from small consumers and were, in general, for August shipment. Dealers and speculative interests feel that lead is likely to approach 7 cents again. The demand in the Middle West has kept particularly strong and the market seems bare of supplies. Even the large consumers complain that they are unable to buy lead at the St. Louis prices that have been quoted by the metal papers recently.

Activities of the Trade

Devoted to News of the Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

Kerr Turbine Reorganization

The Kerr Turbine Company, Wellsville, N. Y., has just undergone a reorganization through the acquisition of practically all its common stock by new interests. Paul B. Hanks, the former president, having disposed of his holdings, has resigned and has been succeeded by W. T. Hamilton, Pittsburgh.

Ample capital for expansion has been put into the business of a sufficient amount to take care of all the present and future requirements, enabling the company to take care of any volume of business that may be developed in its line of manufacture.

Form New Engineering Firm

Ralph B. Coleman, his brother and several others have formed the Coleman Engineering Company, which will do business at 104 North Minnesota Avenue, Sioux Falls, S. D. R. B. Coleman has had over thirty-five years experience and his brother thirty years as electrical salesmen. The firm will handle boilers, generators, transformers, motors, high line apparatus, oil-gas engines and steam engines, waterwheels and governors. They will also figure on the construction of complete power plants.

Baltimore Electrical Supply to Open Branch in Florida

In order to more properly handle the electrical supply business of the extreme South and insure quick deliveries of material to its customers, the Baltimore Electrical Supply Company, with headquarters at 307 North Calvert Street, Baltimore, will open a branch store at 17 Ocean Street, Jacksonville, Fla., in August. This branch will be an entirely separate corporation, however, and will be called the Jacksonville Electrical Supply Company, Inc., of Florida.

The officers of the new firm are W. J. Flannery, president; J. J. Smith, secretary and treasurer, and Oscar A. Flannery, sales manager. The premises of the Jacksonville branch will contain about 6,000 sq.ft. of floor space, with warehouses in the rear of the main building, carrying a stock of approximately $35,000 to $40,000, representing through the Florida territory the Arrow Electric Company, the Rome Wire Company, "Colonial" lamps, "Red Seal" dry batteries and a general line of high grade electrical supplies, in order to insure shipment the same day an order is received. This supply house will cover the entire state of Florida and the southern parts of Georgia.

Hoover Company Holds Third International Convention

The third international convention of the Hoover Company, North Canton, Ohio, manufacturer of electrical cleaners, was held last month. Salesmen from all over the United States Canada and Great Britain attended.

In the morning a parade was held by the company. The floats and programs, accompanying the parade, were instructive and entertaining. Every department of the company in the parade was dressed in uniforms of various makes. All carried toy rubber balloons, and as the march came to a close at a park, each department tied its balloons together, fastened its slogan to them and let them go up.

S. Morgan Smith Awarded Order for Two 2,000-Hp. Waterwheels

The Holyoke Water Power Company, Holyoke, Mass., has awarded to the S. Morgan Smith Company, York, Pa., a contract for two 2,000-hp. waterwheels, to be installed at the new plant under construction at an overflow near the Whiting Paper Company. The wheels will be attached to generators feeding into the switchboard at the power company's main plant. It is estimated the installation will save 18,000 tons of coal yearly.

Using Novelty Containers for National X-Ray Reflectors

For focusing attention toward its new line of reflectors for 50-watt lamps, the National X-Ray Reflector Company, 235 West Jackson Boulevard, Chicago, is sending out each unit in a carload container around which is pasted numbers to represent dice. Three new lines have been added, whose diameter vary from 4½ to 5½ in. Two of the reflectors are for lighting display cases and commercial exhibits, while the other unit was designed for drop cord bench lighting work.

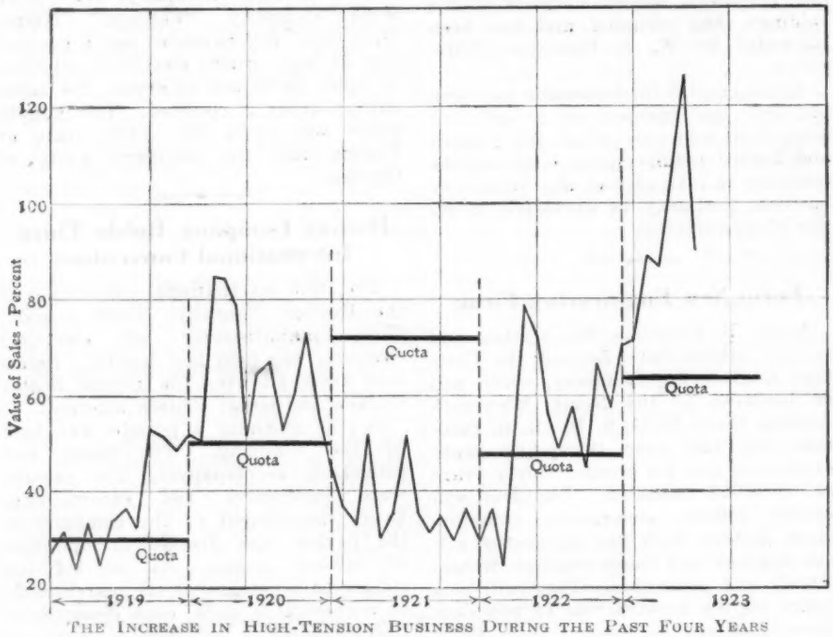
Comparative Prices of Station Supplies

	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars, per lb.	$0.0337	$0.034	$0.0276
Cold finished shafting, per lb.	0.0428	0.042	0.0355
Brass rods, per lb.	0.1825	0.1850	0.1650
Solder (half and half), per lb.	0.276	0.2862	0.21
Cotton waste, per lb.	0.1231	0.1231	0.101
Washers, cast iron (¼-in.), per 100 lb.	4.66	4.66	3.83
Emery, disks, cloth, No. 1, 6-in. diameter, per 100	3.08	3.08	3.11
Machine oil, per gal.	0.349	0.349	0.36
Belting, leather, medium, off list	37%	42½%	46¾%
Machine bolts, up to 1-in. x 30-in., off list	44¼%	44¼%	53¾%

Electrical Engineers Equipment Sales Highest in May, 1923

Some indication of the present activity in the high-tension field may be found in the accompanying chart, obtained from the Electrical Engineers Equipment Company, 710 West Madison Street, Chicago. This chart, ranging over a period of four years, gives the value of sales expressed in percentages as against the quota established for those years.

In analyzing these sales it is interesting to note that during both the years 1919 and 1920 this quota was exceeded. However, the 1921 quota was defined on the basis of business obtained in 1922. Naturally, when business conditions became abnormal in that year, there also occurred a slump in power developments. The return of good business may be taken from the figures in 1922, which overexceeded the quota established, thereby showing rapid advances during the latter part of that year and running into 1923. The peak load for sales of this organization happened in May, 1923, when that month exceeded the quota by 60 per cent. This chart was furnished through the courtesy of R. T. Calloway, sales manager of this organization.



THE INCREASE IN HIGH-TENSION BUSINESS DURING THE PAST FOUR YEARS FOR ONE COMPANY

Allis-Chalmers Sales Billed in Second Quarter Were $6,082,070

The Allis-Chalmers Manufacturing Company, Milwaukee, on July 30 reported sales billed of $6,082,070 in the three months ended June 30, against $4,778,863 in the same period last year.

Net profits for the period were $628,418.24, after expenses and taxes, equal to $1.30 a share on the common stock after allowing for preferred dividends. In the same period last year net profits were $299,796, equal to 4 cents a share on the outstanding common stock.

For the first six months of 1923 sales billed aggregated $11,303,762, against $9,450,465 in the first half of 1922. Net profits were $1,097,108, against $578,529, equal to $1.99 a share on the common stock in the first half of this year.

Habirshaw Reorganization Body Outlines Company's Position

The committee on reorganization of the Habirshaw Electric Company and its affiliated organizations has sent a letter to creditors outlining the probable financial position of the company upon completion of the proposed reorganization.

For the first six months of 1923 sales organization.

The letter shows that total claims filed against the company approximate $6,472,589. In its statement the committee says it is advised that the statement of claims includes only those filed against one company and does not include claims filed against one or more of the other companies based on indorsement or guaranty of the same obligation.

"Based upon information obtained by the committee from the receivers," says the letter, "it is estimated that, after giving effect to the new financing contemplated by the plan, the balance sheet of the new company as of June 2, 1923, would be substantially as follows:

"Current assets, $2,115,506; plant, $2,500,000, and reels and lags, $213,415; total assets, $4,829,415. Liabilities, reels and lags, $275,274; preferred stock, $1,500,000, and common stock, $3,054.141. Total liabilities, $4,829,415." The current assets include $724,804 cash, $398,657 notes and accounts receivable, $3,180 other current assets, and $988,865 value of inventory.

"On the basis of the above estimated balance sheet," says the letter, "the book value of the common stock of the new company would be about $100 per share.

"The committee is advised by the receivers that since Jan. 1, 1923, the business conducted by the receivers has resulted in an average operating profit of about $80,000 a month, exclusive of depreciation, interest on investment, etc. The committee is also advised by the receivers that a large element of the above profit was due to favorable contracts which expire Oct. 1, 1923, and that since June 2, 1923, a 10 per cent reduction in the price of wire has been established which will lessen future earnings considerably."

Orders for New "Orangeburg" System Expected to Reach $500,000

Orders for the new "Orangeburg" underflow duct system, manufactured by the Fibre Conduit Company and sold through the Johns-Manville Company, are expected to reach $500,000 by January, 1924. Some of the recent large orders for this company include the new buildings of the City Savings Institution, Albany, N. Y., at a cost of $6,000; the National Life & Accident Company, Nashville, Tenn., $2,500; the Southern New England Telephone Company, New Haven, Conn., $2,500; the New York Telephone Company, New York City, $4,000; the Lincoln Life Insurance Company, Fort Wayne, Ind., $3,500; the Greenwich Savings Bank, New York, N. Y., $7,500, and the First National Bank, Boston, Mass., $4,500.

Valentine-Clark Moves Main Office to St. Paul

The main office of the Valentine-Clark Company, including the accounting department, has been moved to the yard at 2516 Doswell Avenue, St. Paul. The move has been made to facilitate the handling of business by concentrating the pole yarding, treating and the business of selling at one point. The post office address remains Minneapolis, and a special wire from Minneapolis to the yards and office has been provided for the handling of all telegrams and long-distance calls.

G. E. and Westinghouse Are Awarded $950,000 Cahokia Turbine Orders

Orders for two turbines to be installed in the second section of the new Cahokia station of the Union Electric Light & Power Company, St. Louis, have been awarded to the General Electric Company and the Westinghouse Electric & Manufacturing Company by McClellan & Junkersfeld, Inc. The combined order amounts to about $950,000 and comprises 65,000 kva.

General Electric will build the 30,000-kva. unit for April, 1924, delivery, and Westinghouse the 35,000-kva. unit for delivery in April, 1925. Both turbines will be constructed for 300 lb. of steam pressure at the throttle and will be arranged for bleeding steam for feedwater heating. Westinghouse will construct the "Bauman" type, which is

single-flow, at 1,800 r.p.m., and General Electric its standard type, with several detailed improvements, also at 1,800 r.p.m.

According to information received early this week from McClellan & Junkersfeld, Inc., contracts for boiler equipment will not be awarded until November. Steel orders have been awarded to the Fort Pitt Bridge Works and other pile orders to the Raymond Concrete Pile Company. Construction using these materials will start this month. It was pointed out by the engineering firm that owing to the fact that it is necessary to have the Cahokia Station completed as soon as possible in order to serve the increasing demand for light and power in the St. Louis territory, these contracts for the second section were awarded before the first section was finished.

Master Electric Ships Largest Motor Order from Dayton, Ohio

"Business is good"—this message was proclaimed in Dayton, Ohio, recently when the Master Electric Company paraded its trucks through that city carrying the largest shipment of motors that ever left Dayton in a single day. The shipment, which was hauled on six huge trucks, was part of large orders placed by manufacturers of water systems, refrigerating plants, compressors and other labor-saving devices.

Officials of Master Electric say orders for 1923 have been the largest in the company's history. Three times as much business is being done at this time as during the same period of last year and all indications point to a continuation of this production basis.

Simplex Order for 107 Ranges

One hundred and seven Simplex cabinet-type electric ranges are to be installed in the Huntington Apartments, now being erected in San Francisco at California and Taylor Streets. Each range will have a capacity of 7.7 kw. The intallation was sold by "Doc" Libbey, Western sales representative of the Simplex Electric Heating Company. The Huntington Apartment will be the largest apartment-house building in San Francisco.

Plan Consumption 100,000,000 lb. Copper at New Wire Plant

The Brenner-Mosley-Mervis Company has been organized to produce copper rods and drawn copper wire in Chicago. With a paid-in capitalization of $600,000 the organization has acquired an 8-acre track of land on South Kedzie Avenue adjoining the sanitary canal. The first unit of the contemplated plant now under construction will have a frontage on Kedzie Avenue of 116 ft. and a depth of 388 ft.

Production plans call for a consumption of 100,000,000 lb. of copper annually, with an energy consumption of 4,000 hp. One purpose of launching this new company was to relieve customers of the added freight costs and delays accruing from Eastern and more distant markets.

Nathan P. Brenner will head this new company, besides serving as the head of the American Insulated Wire & Cable Company. The vice-presidents will be W. J. Mosley and George T. Mosley. N. D. Brenner, Jr., and Mayer B. Mervis, both of the American Insulated Wire & Cable Company, will be respectively the treasurer and secretary of this new organization. These five men will also comprise the directorate of the new organization.

Green Equipment Appointment

The Green Equipment Corporation, 53 West Jackson Boulevard, Chicago, manufacturer of commutator undercutting tools, commutator stones and cements, announces the appointment of Thomas H. Endicott as vice-president and general manager. Mr. Endicott is well known in industrial circles because of his former contact with the trade as sales engineers for the Crocker-Wheeler Company and later as sales manager for the metal-cutting department of the E. C. Atkins Company. Recently he organized a company to serve as engineering consultant to industrials, with headquarters in Indianapolis.

The Packard Electric Company, Dana Avenue, Warren, Ohio, is completing plans and will soon take bids for the construction of a three-story and basement addition to its plant, 85 ft. x 200 ft. The company is also planning for the construction of a one-story warehouse and distributing building 45 ft. x 200 ft., on an adjoining site.

The Western Electric Company has leased the three-story factory of the John H. Meyer Company, 708-720 Frelinghuysen Avenue, Newark, N. J., heretofore devoted to the manufacture of tire fabrics, for the establishment of a new plant for the manufacture of its regular line of telephone apparatus, etc. The company will take possession about Sept. 1 and will commence the installation of necessary equipment. It is purposed to provide facilities for the employment of about 750 operatives and to inaugurate work early in October. It is said that the company has acquired the structure for the establishment of an organization prior to the occupancy of its new plant on the Kearny Meadows, Kearny, N. J., estimated to cost more than $5,000,000, and on which excavations have just been commenced. Ultimately the new Newark plant will be consolidated with the Kearny works.

The Memco Engineering & Manufacturing Company, 24 Vanderbilt Avenue, Brooklyn, N. Y., manufacturer of electrical equipment, has leased a building at Hamilton and Freeman Avenues, Long Island City, and will occupy the plant at an early date for a new works.

The Arrow Electric Company, Hartford, Conn., has arranged for an increase in capital stock from $1,600,000 to $3,000,000 for general expansion.

The Electrical Alloy Company, Morristown, N. J., manufacturer of electrical wire, etc., has commenced operations at its new rolling mill, recently completed, 60 ft. x 125 ft., consisting of motor-driven rolls, electric furnace and auxiliary equipment. The new mill will be used for the rolling of special alloys in bar and ribbon shapes for use at the wire works of the company on Ridgedale Avenue.

SIX TRUCK LOADS OF MOTORS READY TO BE SHIPPED FROM DAYTON, OHIO, TO LABOR-SAVING DEVICE MANUFACTURERS

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

Purchase is desired in Nagoya, Japan (No. 7,287), of electrical display signs and advertising signs.

Purchase is desired in Leksand, Sweden (No. 7,347), of a power transformer, 6,300/800-volt, three-phase, and mercury-arc rectifiers.

An agency is desired in Damascus, Syria (No. 7,336), for wiring supplies and fixtures.

Purchase is desired in Santo Domingo, Dominican Republic (No. 7,323), of a complete cold-storage plant.

An agency is desired in Turin, Italy (No. 7,333), for refrigerating plants, especially those of small type.

AUTOMATIC TELEPHONES FOR MEXICO CITY, MEXICO—The Department of Communications and Public Works, Commerce Reports states, has granted one of the telephone companies in Mexico City permission to change its present system to that of automatic telephones.

EXTENSIONS TO THE TEGUCIGALPA, HONDURAS ELECTRIC PLANT PROPOSED—Plans for the installation of additional hydroelectric units to serve the city of Tegucigalpa are being considered, according to Consul Robert L. Keiser, of that district. No definite arrangements for the proposed work have been completed.

PROPOSED ELECTRIC PLANTS FOR EAST AFRICA.—The East African Power & Lighting Company has applied for licenses to establish electric generating plants at Mombasa, near Thika, at Eldoret and Nakuru, Kenya Colony.

PROPOSED ELECTRIC PLANT FOR AOSTA, ITALY—The Società Anonima Termoelettrica Ligure Piemontese has been organized at Milan, Italy, for the purpose of securing a concession to build an 18,000-kw. steam-driven electric generating station at La Thurle, Aosta.

AUTOMATIC TELEPHONES IN THE NETHERLANDS.—Developments in the telephone field, according to *Commerce Reports*, indicate the adoption of a complete automatic system in all the principal cities of the Netherlands in the near future. The telephone system in the larger cities of the country, and in fact in all cities and towns with few exceptions, are owned and operated by the national government as a supplement to its mail and telegraph services, or by the municipalities under concession from the national government.

New Apparatus and Publications

CONNECTORS.—Dossert & Company, 242 West Forty-first Street, New York City, have issued new price sheets covering all types and sizes of "Dossert" connectors.

FILTERS AND GREASE EXTRACTORS.—The Elliott Company, Jeannette, Pa., has issued catalog R-1, which describes and illustrates the "Lagonda" filters and grease extractors.

EXTENSION TRANSFORMER.—Bulletin No. 2,025, issued by the Pittsburgh Transformer Company, Pittsburgh, Pa., describes its new "Pittsburgh" farm-line extension transformer.

ELECTRIC DRILLS.—The Temco Electric Motor Company, Leipsic, Ohio, has recently added two new models to its "Temco" line of drills, known as model "D" and model "K." The former can be used for making ¼-in. holes or smaller, and the latter for ½-in. holes.

CENTRIFUGAL PUMP.—The De Laval Steam Turbine Company, Trenton, N. J., is distributing catalog H, entitled "Multistage Series Pumps" in which it describes a new style of centrifugal pump called a "Series Pump," manufactured by the company. These pumps are made with two or three stages.

STOKERS.—The McClave-Brooks Company, Scranton, Pa., has developed a new mechanical stoker for all grades of bituminous coal and lignite. A hopper-feed hand stoker for burning all grades of bituminous fuel, screenings, slack, coke and lignite has also been designed by the company.

SPLICES AND TAPES.—The Okonite Company, Passaic, N. J., has issued a booklet entitled "Splices and Tapes," in which it describes its splicing compound and adhesive tapes and also gives instructions for making a perfect splice or joint.

ELECTRIC DRILL BENCH STAND.—The Standard Electric Tool Company, Cincinnati, is placing on the market an improved electric drill bench stand for use in connection with electric portable hand drills.

MOTOR STARTING SWITCHES.—The Trumbull Electric Manufacturing Company, Plainville, Conn., is distributing bulletin No. 4 covering its new motor starting switches with overload relay and under voltage release coil.

ELECTRIC WELDER.—The Todd Shipyards Corporation, 25 Broadway, New York City, has brought out a new electric welding machine, known as the "Todd" twin-pole electric welder.

ELECTRICAL SUPPLIES.—The Steel City Electric Company, Pittsburgh, Pa., is distributing catalog No. 34, covering its complete line of electrical products.

New Incorporations

THE HUTCHINSON (MINN.) LIGHTING & MANUFACTURING COMPANY has been incorporated with a capital stock of $50,000 by I. B. Jorgenson, C. R. Zickrick, P. P. Pendergast and H. C. Schluter.

THE WOLVERINE POWER COMPANY, Edenville, Mich., has been incorporated to build four hydro-electric plants on the Tittabawassee and Tobacco Rivers, the output to be utilized by the Consumers' Power Company, Jackson. The officers are: Frank I. Nixon, Edenville, Mich., president, and William C. Manning, Detroit, vice-president.

THE WEST VIRGINIA TRANSMISSION COMPANY, Martinsburg, W. Va., has been incorporated by Cleveland M. Selbert, Charles R. Beall and Clarence E. Martin. The company proposes to erect a transmission line from the new power plant at Williamsport, Md., to Cumberland, Md., to connect with the system of the American Water Works & Electric Company.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

PATTEN, ME.—The Merrill Mill Company contemplates rebuilding its electric plant and woodworking mill, recently damaged by fire, with loss of about $75,000.

PORTLAND, ME.—Plans are under consideration for the linking up of all the power systems of Maine from Bangor to the New Hampshire line. The project will include the electric lines of the Central Maine Power Company, the Cumberland County Power & Light Company and the Bangor Railway & Light Company.

EAST BRAINTREE, MASS.—The East Braintree Bleacheries, Inc., will build a power house at its mill on Adams Street.

MEDFORD, MASS.—Plans are under consideration by the Council for the installation of an ornamental lighting system on Salem, Main and High Streets.

MIDDLEBORO, MASS.—Bids for the proposed municipal power house at Muttock for the municipal electric system have been rejected by the Selectmen. New bids, it is understood, will be asked for.

WAKEFIELD, MASS.—A site has been acquired on Water Street for the new substation of the municipal electric system. Preliminary work will soon be started on laying the underground conduits between the Water Street site and Stoneham for cables for the distribution of high-tension current.

PROVIDENCE, R. I.—The Narragansett Electric Light Company plans to build a four-story substation on Elm Street.

ESSEX, CONN.—The property of the Essex Light & Power Company has been acquired by the Central Connecticut Power & Light Company, East Hampton. Plans for the amalgamation of the two companies include the raising of the dam of the latter company in the Salmon River at Leesville from 18 ft. to 78 ft., at a cost of about $500,000.

Middle Atlantic States

BUFFALO, N. Y.—The New York Central Railroad Company will build an addition to the transformer station at its shops on Bailey Avenue.

BUFFALO, N. Y.—Plans for the proposed municipal market building to be erected on Elk Street by the Department of Parks and Public Buildings provide for a refrigerating plant.

CHELSEA, N. Y.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 23 for the installation of an automatic telephone system in the United States Veterans' Hospital, Chelsea. For details see Searchlight Section.

ELLENBURGH, N. Y.—The Public Service Commission has granted Norman I. White permission to erect a transmission line from his electric plant on Big Chazy River through the town of Moers and a distributing system in the towns of Altona and Ellenburgh under franchises granted by the Town Boards.

GLENS FALLS, N. Y.—The Moreau Manufacturing Company is planning to build a hydroelectric plant on Sherman Island, to cost about $1,000,000.

MEDINA, N. Y.—The Clark-Allis Vinegar Company plans to rebuild its power house, cold-storage plant and factory, recently damaged by fire, causing a loss of about $50,000.

NEW YORK, N. Y.—Electric power equipment will be installed in the new ice and refrigerating plant to be established by the United Refrigeration & Terminals Company at the former brewing plant of the Bernheimer & Schwartz Co., Amsterdam Avenue, between Lawrence and 128th Streets.

NORTH TONAWANDA, N. Y.—The Tonawanda Power Company contemplates the erection of a transmission line on the Lockport Road, from Ward Road to Military Road, for commercial service in this section.

WEST SAND LAKE, N. Y.—The Wynantskill Hydro-Electric Company has applied to the Public Service Commission for permission to issue bonds for improvements to its system, including the installation of new equipment in its generating plant. A street-lighting system will be established consisting of thirty-four lamps in District No. 1 and 103 lamps in District No. 2.

BLOOMSBURY, N. J.—The New Jersey Power & Light Company, Dover, will build a local substation. A transmission line will be erected to Stewartsville.

EDINBURG, N. J.—The Electric Light & Power Company of Hightstown plans to erect a transmission line and install a local system for commercial service.

HADDONFIELD, N. J.—Bids will be received by the Board of Commissioners of the borough of Haddonfield until Aug. 16 for the construction of a sanitary sewer system, including an electrically operated sewage-pumping station. Remington & Vosbury, 601 Market Street, Camden, are engineers.

TRENTON, N. J.—The Trenton & Mercer County Traction Company plans extensions to its power plant, including the installation of additional machinery, to cost about $500,000.

GLENIRON, PA.—The Gleniron Power & Tool Company, recently organized, plans to install an electric system for local commercial service.

HARRISBURG, PA.—Bids will be received by Berkey H. Boyd, secretary of the Department of Property and Supplies, Capitol Building, Harrisburg, until Aug. 23 for completing the new South office building in Capitol Park, as follows: Contract No. 4—heating and ventilating; Contract No. 5—electrical work; Contract 6—plumbing and drainage; Contract No. 7—vacuum cleaning system; Contract No. 8—drinking-water refrigeration system, and Contract No. 9—electric elevators and lifts. Arnold W. Brunner, 101 Park Avenue, New York City, is architect.

HAZLETON, PA.—The Pennsylvania Power & Light Company plans to install a street-lighting system at Park View, near Hazleton.

LANCASTER, PA.—Electrically operated

pumping machinery will be installed in connection with a proposed sewerage system, to cost about $1,000,000, which has been ordered by the State Board of Health.

LEBANON, PA.—The Metropolitan Edison Company is negotiating for the purchase of the property of the Weimer Electric Light & Power Company. Extensions will be made in the transmission system.

LEIGHTON, PA.—The Leighton Water Company contemplates improvements to its plant, including the installation of electrically operated pumping machinery. The cost is estimated at about $40,000.

LEWISTOWN, PA. — The Pennsylvania Wire Glass Company, Pennsylvania Building, Philadelphia, plans to construct a power house in connection with its proposed local plant, to cost about $250,000.

PHILADELPHIA, PA.—The Ford Motor Company, Highland Park, Mich., plans to construct a power house in connection with its proposed assembling plant at Sixty-third Street, Gibson and Eastwick Avenues, to cost about $1,000,000.

WILMINGTON, DEL. — Electric power equipment will be installed at the proposed ice-manufacturing and cold storage plant of the Holstein-Harvey Terminal, Inc., to be located at French and Water Streets, to cost about $500,000.

BALTIMORE, MD. — The Consolidated Gas, Electric Light & Power Company will build an addition at its plant on Kloman Street, to cost $100,000.

CUMBERLAND, MD.—The Baltimore & Ohio Railroad Company plans to install electric and steam power equipment at its tie-treating and wood-preserving plant at Green Spring, to cost about $115,000.

BACHMAN, W. VA. — The Cataract Smokeless Coal Company, recently organized, is planning to equip its coal properties in this section with electrically-operated machinery.

CABIN CREEK JUNCTION, W. VA.—Plans are being prepared by the Virginia Power Company, Charleston, for improvements to its local plant, including the construction of a coal-storage basin, extension to power plant, etc.

CHELYAN, W. VA.—The capital stock of the Chelyan Electric, Water & Ice Company has been increased from $25,000 to $50,000.

MONTGOMERY, W. VA. — The State Supreme Court has issued a peremptory writ instructing the Montgomery Water & Light Improvement Company to make improvements to its plant and mains as ordered by the Public Service Commission.

PRUNTYTOWN, W. VA.—Bids will be received by the State Board of Control, Charleston, until Sept. 28 for construction of school building at the West Virginia Industrial School for Boys at Pruntytown, including electric wiring, conduit system, intercommunicating telephone system, heating system, etc. R. A. Gillis, Fairmont, is architect.

WELLSBURG, W. VA.—Bids will be received by the City Water Board until Aug. 15 for furnishing and installing a 2,000,000-gal. motor-driven centrifugal low-lift pump and a 2,000,000-gal. motor-driven centrifugal high-lift pump with all necessary appurtenances. Hudson & Myron, Wabash Building, Pittsburgh, Pa., are engineers.

MARTINSVILLE, VA.—The Town Council has entered into an agreement with the Appalachian Power Company, Bluefield, W. Va., whereby the company will extend its transmission line to furnish electricity in Martinsville, to be distributed by the municipal system.

PORTSMOUTH, VA.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Aug. 14, for three motors, controllers and spare parts. (Schedule 1137.)

RADFORD, VA.—J. P. McConnell and Harold C. Tyler plan to construct a power house in connection with the establishment of a local stone quarrying and crushing plant.

WASHINGTON, D. C.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 7 for fire protection equipment in the United States Treasury Annex No. 2, Washington, D. C. For details see Searchlight Section.

North Central States

DETROIT, MICH.—The Père Marquette Railroad Company plans to construct a power house at its shops on West Jefferson Street, to cost about $30,000.

GRAND RAPIDS, MICH. — Work will soon begin on rebuilding the power plant of the Valley City Milling Company on Michigan Street between the Grand Trunk depot and Hotel Rowe. Considerable new equipment will be required. The plant supplies electricity for lighting and heating the Hotel Rowe.

ITHACA, MICH.—The Consumers' Power Company, Jackson, has been granted a franchise in Ithaca, to construct a transmission line and install a local system.

LANSING, MICH.—Plans are under consideration by the Durant Motors, Inc., to double the output of its power plant.

COLUMBUS, OHIO.—Bids will be received by the Board of Commissioners of Franklin County, Columbus, until Aug. 20 for repairs and alterations to the electric wiring and the piping in the tunnel in the Franklin County Children's Home.

HOPKINSVILLE, KY.—Work has started on improvements to the power plant of the Kentucky-Tennessee Light & Power Company. The cost is estimated at $300,000. A. J. Nott, assistant engineer of the J. G. White Management Corporation, 43 Exchange Place New York City, is in charge of construction.

INDIANAPOLIS, IND.—The Merchants Heat & Light Company will issue $95,000 in bonds, and $148,000 in capital stock, part of the proceeds to be used for extensions and improvements.

CHICAGO, ILL. — The Commonwealth Edison Company plans to build a machine shop at Fisk and Twenty-second Streets, to cost about $225,000.

BEAVER DAM, WIS. — Extensive improvements are contemplated by the Wisconsin Power, Heat & Light Company to its local system, to include a new switchboard, new feeder regulators, etc., to cost about $8,000.

MOUNT HOREB, WIS.—The Darlington (Wis.) Electric Company is negotiating for the purchase of the property of the Mount Horeb Heat, Light & Power Company. Improvements are contemplated to the system.

STEVENS POINT, WIS.—The Wisconsin Valley Electric Company is considering the erection of a transmission line to serve the towns of Auburndale, Vesper, Sherry and Junction City.

WATERTOWN, WIS. — The Council is considering extending the street-lighting system to the outskirts of the town.

AUSTIN, MINN.—The installation of an ornamental lighting system in the downtown district has been authorized by the voters.

HIBBING, MINN. — Arrangements are being made by the Phoenix Power Company (recently incorporated) for the erection of a transmission line between Hibbing and Thomson which will supply electricity in many localities in the range district.

TAOPI, MINN.—The voters have authorized an issue of $5,000 in electric light bonds.

VILLISCA, IOWA.—Plans are under way for the construction of a municipal electric plant, to cost about $75,000.

KANSAS CITY, MO.—The Kansas City Power & Light Company will erect a building at Pennsylvania Avenue and Twenty-fifth Street for general operating service, to cost about $125,000.

REPUBLIC, MO.—Jared R. Woodfill, Jr., Aurora, has applied for a franchise to supply electricity for lamps and motors in Republic.

ENDERLIN, N. D.—The Midwest Power Company contemplates extensions to its transmission lines.

HUDSON, S. D.—The local electric light plant was recently damaged by fire. Horace Waldorf is superintendent.

PRESHO, S. D.—The purchase of electrical equipment, including oil engines, electric generators, exciters and switchboard, for the Water Department, it is reported, has been authorized.

ATKINSON, NEB. — The plant of the Atkinson Milling & Light Company was recently damaged by fire.

FREMONT, NEB.—Bonds to the amount of $90,000 have been authorized by the voters of Dodge County for establishing an electric lighting and power distribution system.

SUPERIOR, NEB. — Arrangements are being made by the Southern Nebraska Power Company to acquire the hydro-electric plants at Oak and Hebron and the steam-power plant at Clay Center. Extensions and improvements will be made to the systems.

LAWRENCE, KAN.—The Kansas Electric Power Company has applied to the Public Utilities Commission for permission to extend its transmission line along the Leavenworth, Bonner Springs and White Church Road in Wyandotte County.

SALINA, KAN.—The City Council is considering the installation of electrically-operated pumping machinery in connection with the new sewage disposal works. C. A. Haskins, Finance Building, Kansas City, Mo., is engineer.

TOPEKA, KAN. — The Topeka Edison Company has acquired a water-power site on the Kaw River, near Tecumseh, 6 miles from the city, on which it will build a steam-driven electric plant, with an initial capacity of 15,000 kw., to cost about $2,500,000.

Southern States

RALEIGH, N. C.—The North State Power Company is planning to erect a 22,000-volt, three-phase transmission line to connect its Furquay Springs and Lillington generating stations.

SYLVA, N. C.—Plans are under consideration for the construction of a power plant at the Cullohwee Normal and Industrial School. The equipment will include boilers, engines, generators, switchboards, etc. H. A. Underwood, Raleigh, is engineer.

WAYNESVILLE, N. C.—The Southland Hardwood Lumber Company, recently organized, contemplates the construction of a power house in connection with its proposed local plant.

ANDREWS, S. C.—Bids will be received by the city of Andrews until Aug. 22 for water mains, reservoir, filter and transmission lines, to cost about $70,000. The Ryan Engineering Company, Columbia, is engineer.

COLUMBIA, S. C.—A company is being organized by T. C. Williams and G. A. Guignard to construct and operate two hydro-electric plants with combined capacity of about 200,000 hp., to cost about $1,000,000, with transmission system. One plant will be located on the Salude River, near Columbia, and the other on the Santee-Cooper Canal, Berkeley County.

NINETY-SIX, S. C. — The Ninety-Six Lumber Company contemplates rebuilding its power house and mill recently damaged by fire, causing a loss of about $100,000.

BUSHNELL, FLA.—Bonds to the amount of $15,000 have been authorized for improvements to the electric light plant.

ORANGE PARK, FLA. — Arrangements have been made by the City Commission whereby the Jacksonville municipal electric plant will supply electricity in Orange Park.

WEST PALM BEACH, FLA.—The Southern Utilities Company contemplates installing new electrical machinery, including a 500-hp. boiler.

BRISTOL, TENN.—The City Council has authorized surveys made of the power site on the Holstein River for the proposed municipal hydro-electric plant.

KNOXVILLE, TENN.—Plans are under consideration for the construction of a new power plant on the campus of the University of Tennessee to furnish light, heat and power for all the University buildings. An appropriation of $115,000 has been made for the work.

LAWRENCEBURG, TENN.—An election will soon be held to vote on the proposal to issue $80,000 in bonds for the construction of another dam and power plant on Shoal Creek, between the present dam and power plant.

MARTIN, TENN.—The installation of an ornamental lighting system is under consideration.

GREENVILLE, ALA. — The Alabama Power Company is planning to extend its high-tension transmission lines to Greenville. The company is also negotiating for the purchase of the local electric plant.

MONTGOMERY, ALA. — The Alabama Power Company, which recently took over the electric and gas plants in Montgomery, has offered to install an ornamental lighting system in the business district, providing the merchants will make arrangements for same and for future maintenance.

PRATTVILLE, ALA. — The Alabama Power Company has acquired the local electric distributing system, owned by the Autauga Oil & Fertilizer Company.

MERIDIAN, MISS.—The Lockard Brick Works plan to rebuild their power house and plant, recently damaged by fire, causing a loss of about $60,000.

PINE BLUFFS, ARK.—The installation of electrically-operated pumping machinery in connection with improvements to the municipal waterworks is under consideration. Ford Bennett, Citizens' Bank Building, is engineer.

NEW ORLEANS, LA.—The Algiers Public Service Company contemplates extensions and improvements. The company has recently increased its capital from $250,000 to $500,000.

MONROE, LA.—The Union Power Company, Shreveport, recently organized, plans to construct a power house in connection with its proposed carbon-black manufacturing plant, to cost about $1,000,000.

NEW ORLEANS, LA.—A petition has been presented to the City Commission by the residents of Ursuline Avenue asking for the installation of an ornamental lighting system on that thoroughfare.

AMARILLO, TEX. — Plans are under consideration for the installation of electrically operated pumping machinery in connection with improvements to the waterworks system, to cost about $1,700,000.

BRONTE, TEX.—F. E. Brown and C. C. Holden, recently granted a franchise, are planning to install an electric plant and system.

DALLAS, TEX.—The Gulberson Corporation, manufacturer of oil-well machinery, etc., will install electric power equipment in connection with its proposed plant addition, to cost about $500,000.

EDGEWOOD, TEX. — Bonds have been voted for $55,000 for the installation of a municipal electric lighting plant and waterworks system.

FORT WORTH, TEX.—Plans, it is reported, are being prepared for the installation of 400 new street lamps.

FORT WORTH, TEX.—Extensions and improvements are contemplated by the Northern Texas Traction Company involving an expenditure of about $400,000.

LAREDO, TEX.—The Laredo Electric & Railway Company is contemplating the erection of a boiler house.

MERCEDES, TEX.—An election will be held Aug. 4 to vote on the proposal to issue $150,000 for a municipal electric light plant and waterworks.

SAN ANTONIO, TEX.—The Valley Electric & Ice Company is aking for bids for the construction of a new power house.

SANGER, TEX.—Bonds to the amount of $17,500 have been voted for the installation of a municipal electric light plant. E. L. Dalton, 1915½ Main Street, Dallas, is engineer.

SOUR LAKE, TEX.—The Western Public Service Company contemplates extensions and improvements, including the installation of additional equipment.

Pacific and Mountain States

SEATTLE, WASH.—The Municipal Power Department has acquired property at Third Avenue and Madison Street, on which it will erect a substation.

SEATTLE, WASH.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Aug. 21 for transformers, motor-generator sets and telephone terminal, for use at the Puget Sound Navy Yard. (Schedule 1142.)

TENINO, WASH. — The Puget Sound Power & Light Company will build a transmission line to a point near Olympia for connection with the system of the North Coast Power Company, recently acquired. A local substation will be built.

VANCOUVER, WASH. — Work has started by William Wills, Thompson Building, Seattle, general contractor, on the construction of the power house at the local State School for the Deaf. All sub-contracts in connection with the plant will be handled by the state.

BEND, ORE.—The Bend Water, Light & Power Company contemplates the construction of a hydro-electric power plant on the Tumalo Creek, with an initial installation of 5,000 hp.

PORTLAND, ORE.—Plans are being prepared by W. J. Morris, Spaulding Building, for the establishment of a lumber town, 4 miles east of Oakridge, for G. H. Kelly, Spaulding Building. The project will include an electrically driven sawmill, planing mill, dry kiln, an 8-mile main logging railroad, machine shop, 200 houses, etc., to cost about $2,000,000.

LOS ANGELES, CAL. — Electric power equipment will be installed in the new ice-manufacturing and cold-storage plant to be erected by the Federal Refrigerating Company at Downey Road and District Avenue, to cost about $1,500,000. Frank D. Chase, Inc., is engineer.

OAKLAND, CAL.—The Pacific Gas & Electric Company is planning to erect a new substation in the Lake district on Twenty-first Street, between Grove Street and Telegraph Avenue. The new building will be a temporary structure. A permanent building, to cost $280,000, will be erected in the near future.

SAN FRANCISCO, CAL. — Plans are under consideration by the Down Town Association for the installation of a lighting system on highways leading from the city.

STOCKTON, CAL.—Steps are being taken for the installation of an ornamental lighting system on Miner Avenue between North El Dorado and California Streets. W. B. Hogan is city engineer.

BOISE, IDAHO. — The Federal Power Commission has granted the Unity Gold Mines Company permission to build a diversion dam on Elk Creek, a power house and a transmission line, 9½ miles long, in Idaho and Valley Counties, Idaho.

BOISE, IDAHO. — The Federal Power Commission has granted the Idaho Power Company a fifty-year license covering its transmission and distribution system, consisting of twenty-nine transmission lines throughout the Snake River Basin in southern Idaho and Oregon, aggregating 420 miles in length.

Canada

NORTH BAY, ONT.—The purchase of three generators for the substation at Gormonville, Man., is under consideration by the Hydro-Electric Commission of Ontario, North Bay.

TIMMINS, ONT. — Contract has been awarded by the Hollinger Consolidated Gold Mines Company for the construction of a new dam and power house on the Abitibi River to William Arrol, Ltd., St. Catharines, Ontario, and London, England. The proposed plant will have an output of 25,000 hp., of which 20,000 hp. will be delivered to the mines of the Hollinger company and 2,000 hp. will be for the use of the municipalities in the immediate neighborhood of the plant.

TORONTO, ONT.—Plans are being prepared by the Hydro-Electric Power Commission of Ontario, Toronto, for erecting a transmission line from St. Jacobs to Linwood, to cost about $26,000; also to erect 15 miles of distributing line to Sombra and Port Lambton, to cost about $48,000.

ASBESTOS, QUE.—Johns-Manville, Inc., New York, N. Y., contemplates the construction of a power house in connection with its proposed asbestos goods plant, to cost about $350,000.

Electrical Patents

Announced by U. S. Patent Office

(Issued July 10, 1923)

1,461,571. CONTROL SYSTEM; E. F. W. Alexanderson, Schenectady, N. Y. App. filed March 23, 1920. System for securing maximum output of motor.

1,461,575 and 1,461,576. SHIP PROPULSION SYSTEM; F. H. Clough, Hillmorton, near Rugby, England. App. filed Jan. 29, 1921. Adjustable speed for propelling motors.

1,461,634. RHEOSTAT AND THE LIKE; E. R. Stoekle, Milwaukee, Wis. App. filed July 31, 1922. Electron tube filament rheostat.

1,461,645. AUTOMATIC TELEGRAPH SYSTEM; G. R. Benjamin, Jersey City, N. J. App. filed Nov. 4, 1916. For loop operation.

1,461,661. ELECTROLYZING APPARATUS FOR THE MANUFACTURE OF OXYGEN AND HYDROGEN; G. F. Jaubert, Paris, France. App. filed April 4, 1922. Uses nickel electrodes.

(Issued July 17, 1923)

15,653 (reissue). LIGHTNING ARRESTER; C. T. Allcutt, Wilkinsburg, Pa. App. filed Sept. 1, 1917. For communication lines.

1,461,750 to 1,461,753. CONDUCTOR SUPPORT; H. P. Chandler, Mansfield, Ohio. App. filed Sept. 5, 1922. Clamping ear for trolley wires.

1,461,754. TRANSMITTING AND RECEIVING APPARATUS FOR WIRELESS TELEGRAPHY; G. H. Clark, Brooklyn, N. Y. App. filed March 3, 1921. Increased speed of signal transmission.

1,461,779. HOLDING DEVICE; S. S. Matthes, Mansfield, Ohio. App. filed May 27, 1922. Clamping device for trolley wires.

1,461,780. SUPPORT FOR ELECTRIC CONDUCTORS; S. S. Matthes, Mansfield, Ohio. App. filed Nov. 23, 1922. Crossover for trolley wires.

1,461,781. CURRENT COLLECTOR AND SLEET REMOVER; S. S. Matthes, Mansfield, Ohio. App. filed March 26, 1923. For trolley poles.

1,461,783. SECRET COMMUNICATION SYSTEM; R. D. Parker and B. P. Hamilton, Brooklyn, N. Y. App. filed Dec. 27, 1919. Constant frequency voltage impressed on voice frequencies.

1,461,790. MAXIMUM VOLTAGE INDICATOR; M. Sultzer, Brooklyn, N. Y. App. filed May 31, 1919. Apparatus to detect induced current in telephone line.

1,461,811 and 1,461,812. CONDUCTOR SUPPORT; A. C. Wood, Mansfield, Ohio. App. filed Dec. 30, 1922. Ear for clamping grooved wire to supporting insulator.

1,461,813. SAFETY SUPPORT FOR CURRENT COLLECTORS; A. C. Wood, Mansfield, Ohio. App. filed Jan. 27, 1923. Pole prevented from rising vertically when it leaves wire.

1,461,830. ELECTRICAL INDICATING DEVICE; R. S. O'Neil, London, England. App. filed March 1, 1920. Apparatus for signaling the position of ship's helm.

1,461,840. APPARATUS FOR HUMIDIFYING AIR; L. E. Vignon, Tarare, France. App. filed March 28, 1922. Humidifying air in weaving mills, etc., by means of electric heater.

1,461,852. DRIVING ARRANGEMENT FOR SHIPS; A. T. Kasley, Essington, Pa. App. filed March 29, 1921. Method of changing from Diesel to electric drive.

1,461,862 and 1,461,863. MANUFACTURE OF ELECTRIC FURNACE LININGS; W. R. Clark, Bridgeport, Conn. App. filed Aug. 6, 1917. For induction furnace.

1,461,878. THERMOSTATIC CONTROL; J. E. Harvey, Milton, Mass. App. filed May 23, 1921. For electric iron.

1,461,921. ELECTRIC GAS LAMP; A. Lederer, Vienna, Austria. App. filed May 16, 1914. Electrode of an alkali metal potassium.

1,461,939. WIRE CART; E. R. Sager, United States Army. App. filed Sept. 4, 1920. For stringing telephone lines at battle front.

1,461,980. AUTOMATIC TELEPHONE SYSTEM; M. L. Nelson, Chicago, Ill. App. filed June 30, 1919. For party lines in rural districts.

1,461,988. PANTOGRAPH; R. B. Spikes, San Francisco, Cal. App. filed Nov. 27, 1922. Method of controlling pressure between pantograph and wire.

1,461,996. ELECTRIC STARTER; C. C. Andersen, Salt Lake City, Utah. App. filed May 3, 1922. For automobiles.

1,462,012. RADIATOR THERMOSTAT; A. I. Kaplon, Brunswick, Md. App. filed July 2, 1920. Light on radiator cap in conjunction with motormeter indicates when engine temperature is too high.

1,462,026. PROTECTIVE DEVICE; W. T. Booth, East Orange, N. J. App. filed Nov. 3, 1917. Fuse and lightning arrester combined into one unit for Forest Reserve telephone lines.

1,462,031. NEUTRAL POSITION SAFETY CONTROL; W. E. Day, San Francisco, Cal. App. filed June 30, 1919. For elevators mechanically operated.

1,462,032. MACHINE AND METHOD FOR WINDING ELECTRICAL COILS; H. C. Egerton, Passaic, N. J. App. filed Dec. 29, 1920.

1,462,035. TREATMENT OF MAGNETIC MATERIAL; W. Fondiller, New York, N. Y. App. filed Aug. 10, 1920. Securing uniformity in the permeability to signaling currents of magnetic materials.

1,462,038. MODULATING SYSTEM; R. V. L. Hartley, South Orange, N. J. App. filed Dec. 30, 1916. For transmitting pure modulated wave.

1,462,047. CROSSBAR LINE SWITCH; J. N. Reynolds, Greenwich, Conn. App. filed Oct. 14, 1920. Selector panel for automatic telephone system.

1,462,052. PROCESS FOR OBTAINING NITRIC ACID BY MEANS OF THE ELECTRIC ARC IN A CLOSED CYCLE; W. Siebert, Laufenburg, Switzerland. App. filed May 13, 1922.

1,462,053. ELECTRICAL TESTING SYSTEM; H. M. Stoller, New York, N. Y. App. filed Nov. 13, 1920. Locating faults in telephone lines.

1,462,057. SWITCHING MECHANISM FOR VACUUM TUBES AND THE LIKE; P. I. Wold, East Orange, N. J. App. filed Sept. 27, 1920. Automatic substitution of new tube into circuit when old tube has deteriorated a certain amount.

1,462,085. NON-INTERFERENCE SIGNAL DEVICE; L. Degen, Berkeley, Cal. App. filed Aug. 23, 1920. Sending two or more fire alarms over same wires.

1,462,111. MAGNETIC SEPARATOR; A. F. Jobke, Pittsburgh, Pa. App. filed April 24, 1918.

1,462,124. CUT-OUT BOX; A. L. Pierce, Wallington, Conn. App. filed April 16, 1920.

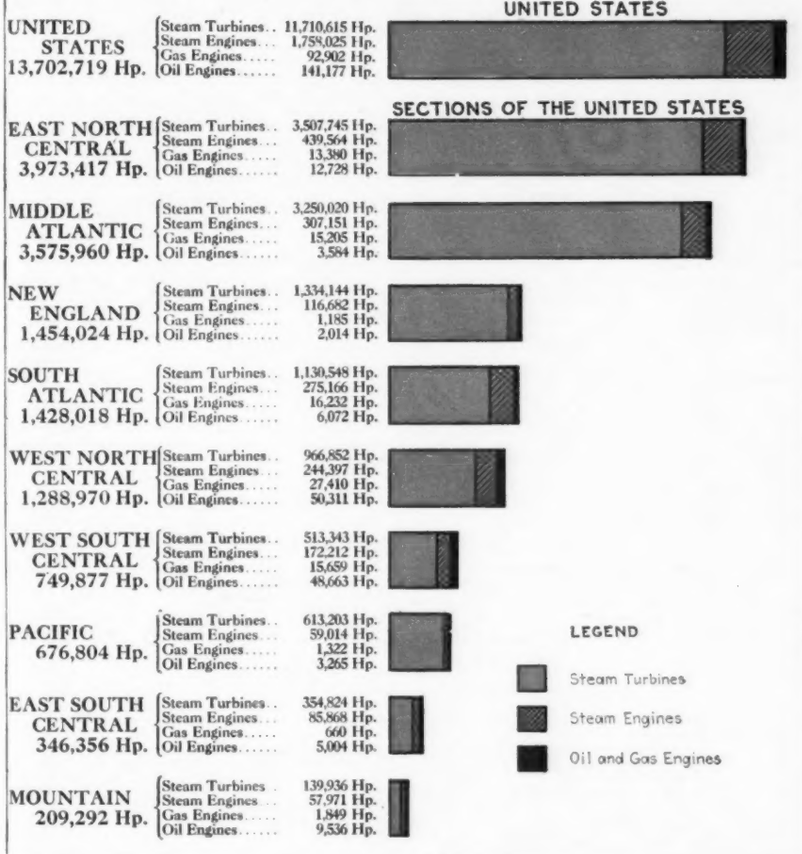
1,462,129. ELECTROMAGNET; E. B. Thurston, Toledo, Ohio. App. filed Sept. 30, 1921. Electromagnetic brake.

Business Facts for Electrical Men

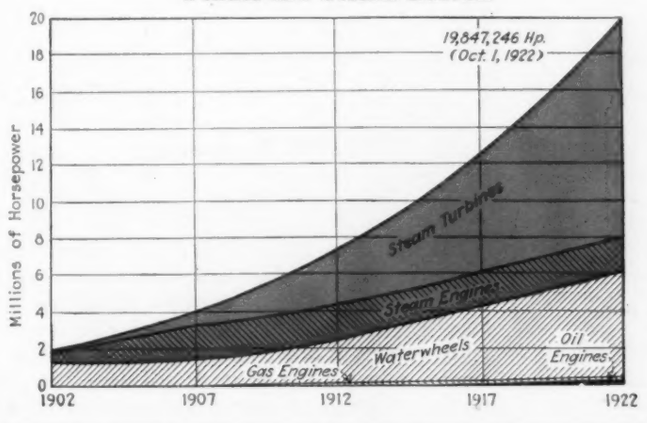
Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

The Steam Turbine Predominates as a Prime Mover in Fuel-Electric Central Generating Plants

(Data as of Oct. 1, 1922)



About 68 Per Cent of the Prime Movers in Central Generating Plants are Steam Driven



The Steam Turbine—a Symbol of Progress

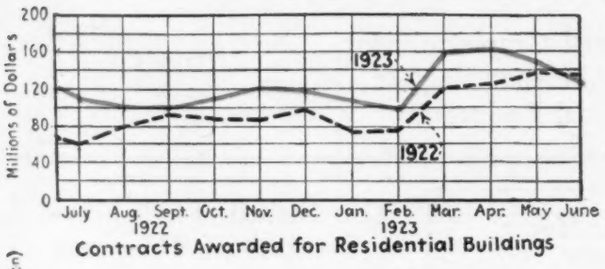
"Is man a child of hope? Do generations press on generations, without progress made?"

ONE of the outstanding characteristics of American industrial activity is the unremitting search for better ways of doing things that have been done well, or for applications of forces which can accomplish greater things than in the past. The question of increased efficiency is applied both to the personnel and to the adaptation of natural forces to the work to be done. Methods of operation which in themselves display a high degree of efficiency must give way before new and better ways of accomplishing the desired results.

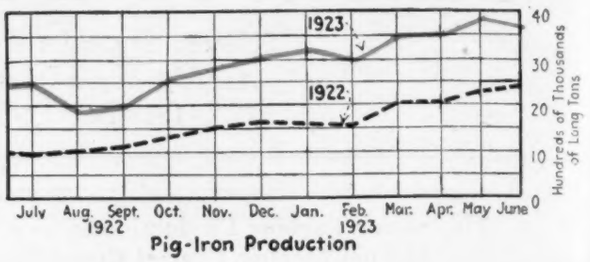
In the rapid ascendency of the steam turbine in central-station generating plants is to be found a clean-cut example of a more efficient method of applying the same force of nature to turn the same or greater "wheels of industry." Trends in power plant engineering practice are marked by distinct and almost abrupt changes. About twenty years ago reciprocating steam-engine-driven units had reached their practicable limit, 7,500 kw. Up to that time few if any turbines of ratings greater than 500 kw. had been designed. So long as ratings remained comparatively small and steam pressures and temperatures reasonably low, if there was any choice in prime movers it was probably in favor of the steam engine. As soon as sizes went above 5,000 kw. the turbine began to have decided advantages. The practical limitation placed on the steam-engine size caused a reaching out for some means of overcoming this barrier, and in 1902 the epoch-making turbine of 2,000 kw. rating was installed at Hartford, Conn. Since that time the use of the steam turbine in central-station generating plants has been rapid, until on Oct. 1, 1922, the steam turbines installed totaled 8,782,961 kw., as against 1,758,025 hp. for steam engines. During the past five years the steam turbine rating has increased 74 per cent, whereas the rating of installed steam engines has increased only 3.3 per cent.

Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers of the ELECTRICAL WORLD to quote or use these statistics for any legitimate purpose. While there is no requirement that the source of data be given, yet it would help the ELECTRICAL WORLD in obtaining and compiling further basic information if those using these statistics would credit the ELECTRICAL WORLD.

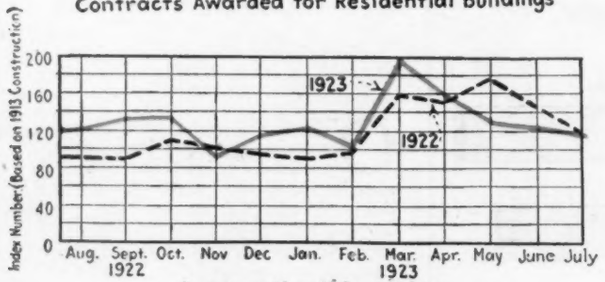
How the Primary Industries Are Trending



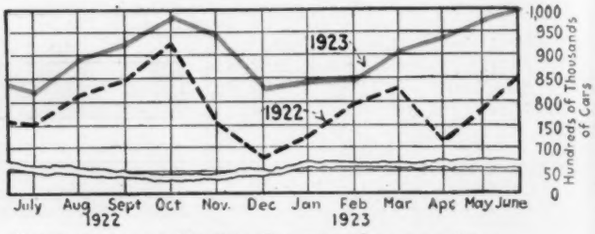
Contracts Awarded for Residential Buildings



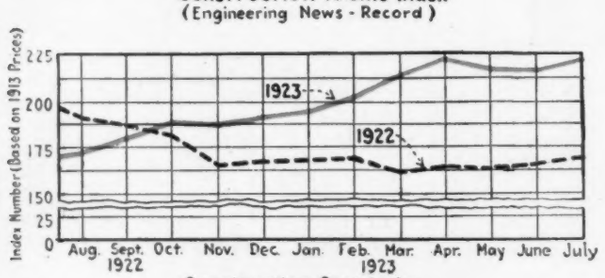
Pig-Iron Production



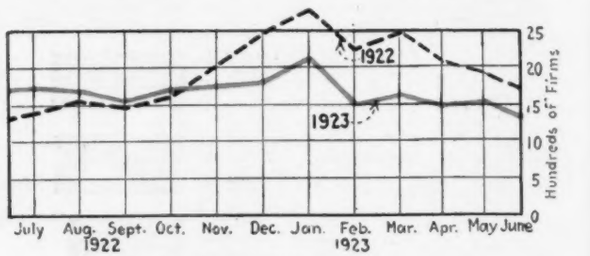
Construction Volume Index
(Engineering News - Record)



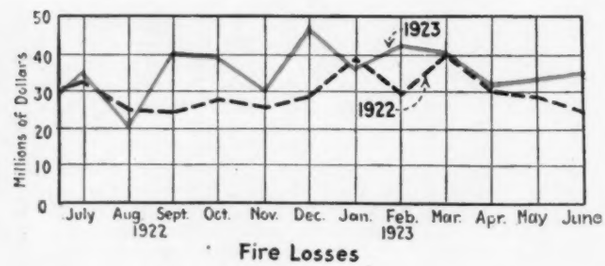
Total Average Weekly Freight-Car Loadings



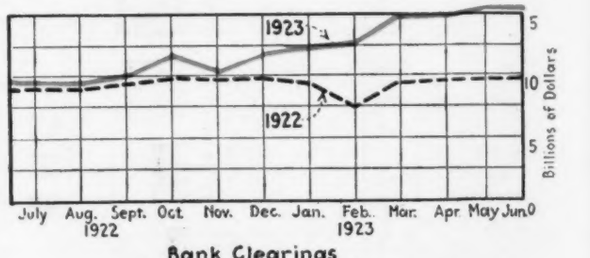
Construction Cost Index
(Engineering News-Record)



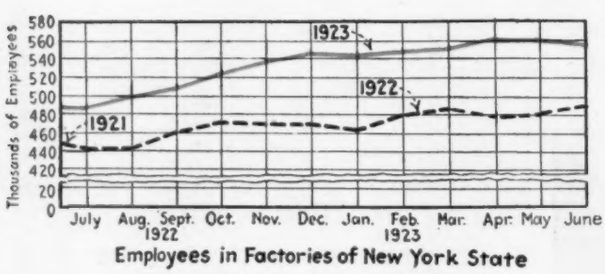
Business Failures



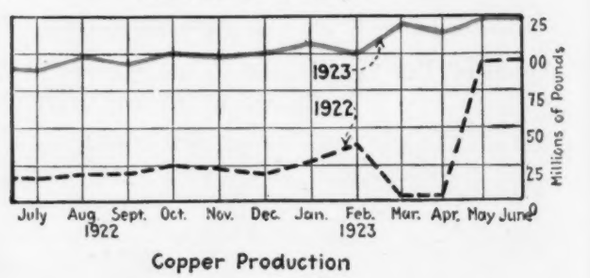
Fire Losses



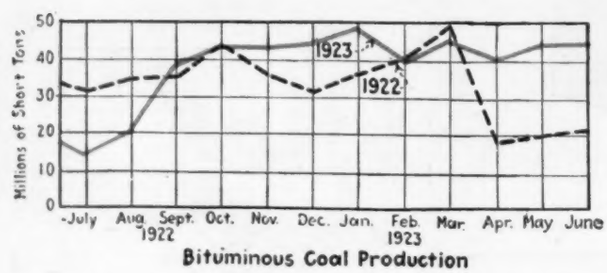
Bank Clearings
(Outside of New York City)



Employees in Factories of New York State



Copper Production



Bituminous Coal Production

Summer Business Bright

PRODUCTION has been well above normal since last November, and after seven months of continual and unusual activity only a few plants have shut down for a brief period, or have slowed up operations in order that they may make necessary repairs, take account of stock and permit employees to have a short vacation. This can be reasonably termed a seasonal movement.